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Air Pollution Technical Information Center
Research Triangle Park, North Carolina

January 1973

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25049-25573

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This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. This issue contains abstracts 25049 - 25573.

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VOLUME 4, NO. 1 JANUARY 1973

Prepared by
Air Pollution Technical Information Center (APTIC)
Research Triangle Park, North Carolina 27711

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Author Index AI-1

Personal authors are arranged alphabetically. The names are presented last name first. The title of the document is indented below the author's name; when the author is the first author of a title, an asterisk precedes the Abstract Number on the next line.

INTRODUCTION

This periodical is intended to inform personnel of the Environmental Protection Agency (EPA), and others who are also professionally interested in air pollution, of selected technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given.

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The serial publications (journals, periodicals, etc.) which are regularly screened for input are listed with their publishers' addresses in one issue in each volume of our abstract bulletin; the most recent list appeared in the December 1971 issue.

As another service, abstracts of all of the literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of the lapse of time entailed by editorial, make-up, and printing work. More than 1400 subject index terms are available for such searching ---more than those included in the subject index in each issue.

Feedback from our users, including suggestions of articles for abstracting, are always welcome.

APTIC Publications

Air Pollution Aspects of Emission Sources: Petroleum Refineries - A Bibliography With Abstracts, July 1972, GPO No. EP 4.9:110, $1.25.

Air Pollution Aspects of Emission Sources: Iron and Steel Mills - A Bibliography With Abstracts, May 1972, GPO No. EP 4.9:107, $1.00.

Air Pollution Aspects of Emission Sources: Boilers - A Bibliography With Abstracts, May 1972, GPO No. EP 4.9:105, $2.00.

Hydrochloric Acid and Air Pollution: An Annotated Bibliography, July 1971, GPO No. EP 4.9:100, $0.55.

Chlorine and Air Pollution: An Annotated Bibliography, July 1971, GPO No. EP 4.9:99, $0.55.

Air Pollution Aspects of Emission Sources: Electric Power Production - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:96, $2.25.

Air Pollution Aspects of Emission Sources: Cement Manufacturing - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:95, $0.50.

Air Pollution Aspects of Emission Sources: Sulfuric Acid Manufacturing - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:94, $0.65.

Air Pollution Aspects of Emission Sources: Nitric Acid Manufacturing - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:93, $0.45. Air Pollution Aspects of Emission Sources: Municipal Incineration - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:92, $1.00.

Photochemical Oxidants and Air Pollution: An Annotated Bibliography (2 Volumes), March 1971, GPO No. EP 4.9:88, $6.25.

Beryllium and Air Pollution: An Annotated Bibliography, February 1971, GPO No. EP 4.9:83, $0.40.

Asbestos and Air Pollution: An Annotated Bibliography, February 1971, GPO No. EP 4.9:82, $0.50.

Municipal Incineration: A Review of Literature, June 1971, GPO No. EP 4.9:79, $1.00.

Hydrocarbons and Air Pollution: An Annotated Bibliography (2 Volumes), October 1970, GPO No. HE 20.1309:75, $5.00.

Nitrogen Oxides: An Annotated Bibliography, August 1970, GPO No. HE 20.1309:72, $2.75.

Air Pollution Translations: A Bibliography With Abstracts Volume I, May 1969, GPO No. FS 2.93/3:56, $1.75.

Air Pollution Translations: A Bibliography With Abstracts Volume II, April 1970, GPO No. HE 20.1309:69, $1.00.

Carbon Monoxide, A Bibliography With Abstracts. 1966, GPO No. PHS 1503, $2.50.

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RECENT CONTRACT AWARDS

from the

Durham Contract Operations
Contracts Management Division, EPA

Contract No. 68-02-0220, RFP No. Du-72-A154 .... *$70,026*
DEVELOPMENT OF AQUEOUS PROCESSES FOR REMOVING NOx AND SO2 FROM COMBUSTION FLUE GASES.
Esso Research and Engineering Company, P.O. Box 8, Linden, New Jersey

Contract No. 68-02-0650, RFP No. Du-72-A098 .... *$345,319*
ENGINEERING AND TECHNICAL SERVICES FOR EMISSION CONTROL PROCESS DEMONSTRATION PROJECTS.
The MITRE Corporation, Westgate Research Park, Mclean, Virginia 22101

Contract No. 68-02-0290, RFP No. Du-72-A098 .... *$456,808*
ENGINEERING AND TECHNICAL SERVICES FOR EMISSION CONTROL PROCESS DEMONSTRATION PROJECTS.
The MITRE Corporation, Westgate Research Park, McLean, Virginia 22101

Contract No. 68-02-0295, RFP No. Du-72-A246 .... *$134,212*
HAZARDOUS AIR POLLUTANTS ENFORCEMENT MANAGEMENT SYSTEM (HAPEMS) AND THE COMPLIANCE DATA SYSTEM (CDS).
The Research Corporation of New England, 125 Silas Deane Highway, Wethersfield, Connecticut 06109

Contract No. 68-02-1009, RFP No. Du-73-A004 .... *$41,179*
STUDY OF PHOTOCHEMICAL REACTIONS OCCURING IN THE SAN FRANCISCO BAY AREA.
Stanford Research Institute, Menlo Park, California 94026

Contract No. 68-02-0599, RFP No. Du-73-B277 .... *$49,887*
OBJECTIVE PROCEDURES FOR OPTIMUM LOCATION OF AIR POLLUTION OBSERVATION STATIONS.
Kaman Sciences Corporation, 1500 Garden of the Gods Road, Colorado Springs, Colorado 80907

Contract No. 68-02-0649, RFP No. Du-72-A219 .... *$40,000*
STUDY AND REPORT ON HIGHWAYS AND AIR QUALITY.
National Academy of Sciences, 2101 Constitution Avenue, Washington, D. C. 20418

Contract No. 68-02-0958 .... *$35,000*
PULMONARY FUNCTION INSTRUMENT (SPIROMETER).
Cardio Pulmonary Instrument Corporation, P. O. Box 36424, Houston, Texas 77036

Contract No. 68-02-1010, RFP No. Du-72-A197 .... *$146,800*
WET COLLECTED LIMESTONE MODIFIED FLY ASH CHARACTERIZATION AND EVALUATION OF POTENTIALLY TOXIC HAZARDS.
The Aerospace Corporation, P. O. Box 95085, Los Angeles, California 90045

Contract No. 68-02-1011, RFP No. Du-73-A016 .... *$59,060*
DEVELOPMENT AND TESTING OF AN AIR MONITORING SYSTEM.
Research Triangle Institute, P. O. Box 12194, Research Triangle Park, North Carolina 27709

Contract No. 68-02-0709 .... *$33,552*
FEASIBILITY STUDY OF SOLID STATE HALOGEN SENSORS FOR STATIONARY POLLUTION SOURCES.
Thunder Scientific Corporation, 623 Wyoming, S.E., Albuquerque, New Mexico 87123

Contract No. 68-02-0694, RFP No. Du-72-B488 .... *$246,323*
SCREENING, CATALOGING, ABSTRACTING AND INDEXING OF AIR POLLUTION TECHNICAL LITERATURE.
The Franklin Institute, The Benjamin Franklin Parkway, Philadelphia Pennsylvania 19103

Contract No. 68-02-0336, Modification No. 1 .... *$39,731*
EVALUATION OF A PHOTOCHEMICAL POLLUTION SIMULATION MODEL.
General Research Corporation, Post Office Box 3587, Santa Barbara, California 93105

Contract No. 68-02-0315, Modification No. 9 .... *$33,929*
CHESS-LOS ANGELES (RIVERSIDE).
Regents of the University of California, University of California, Riverside, California 92502

Contract No. 68-02-0004, RFP No. Du-73-A012, Modification No. 6 .... *$151,526*
INTERSOCIETY COMMITTEE ON METHODS FOR AMBIENT AIR SAMPLING AND ANALYSIS.
The American Public Health Association, 1015 Eighteenth Street, N. W., Washington, D. C. 20036

Contract No. 68-02-0043, Task Order No. 13 .... *$41,965*
COLLECTION OF DATA CONCERNING POINT SOURCES OF AIR POLLUTANT EMISSIONS IN THE STATES OF NEW YORK, WISCONSIN, AND VIRGINIA.
IBM Corporation, Federal Systems Division, Gaithersburg, Maryland 20760

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry--e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS--HUMAN HEALTH

Covers medical and epidemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. EFFECTS--PLANTS AND LIVESTOCK

Effects on vegetation--crops, trees, other plants--and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS--MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractual activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

1972

25049 **APTIC NO. 46402**

JAWA AGAINST AIR POLLUTION. *Czech. Motor Rev., vol. 18, June 1972.*

Although regulations have been passed which limit motor vehicle exhaust emissions, motorcycles have not been included in these regulations. JAWA, a motorcycle manufacturing firm, has tested motorcycle exhausts using the European Test. Uniform emissions tests are necessary since the concentration of emissions varies greatly with the engine power, speed, temperature, and driving conditions. The European Test has been used since 1971. It corresponds to city traffic conditions and tests vehicles at acceleration, normal speed, slowing, and idling. Exhausts are collected and analyzed in a uniform manner to give clear and reproduceable results.

25050 **APTIC NO. 46413**

THE NEW AUDI 80. *(Der neue Audi 80). Text in German. Automobiltech. Z. (Stuttgart), 74(8):335-337, Aug. 1972.*

A brief description of the design of the new Audi 80 is given. One of its most remarkable features is the low pollutant emission of 20 g/mi for carbon monoxide, 2 g/mi for hydrocarbons, and 1.8 g/mi for nitrogen oxides. The combustion chamber is disk shaped. In the intake pipe a vortex is produced of 50 rpm/sec. A new carburetor has been installed. Illustrations of all novel parts are given.

25051 **APTIC NO. 46417**

GAS TURBINES-AIR CELLS-POWER PLANTS. *(Gasturbinen-Luftspeicher- Kraftwerke). Text in German. Elektrotech. Z. B., 24(18):463, 1972.*

Gas turbine power plants may reduce the costs for covering short-term peak demands by using the surplus energy during low-demand periods for compressing air which is then stored underground. In such power plants the compressor driven by a motor is separated from the turbine. During hours of low power consumption, primarily at night, the surplus power is used for operating the air compressor. If the power consumption rises, the stored and compressed air is heated in a combustion chamber or heat exchanger. This heated air drives a gas turbine of special design which supplies its mechanical energy entirely to a generator. The heat of waste gas can be used for heating the air. The specific investment costs for such a power plant are considerably lower than those of all known thermal power plants. Also the specific fuel costs are low. The fuel consumption and the temperature of the waste gas are 2/3 lower than the conventional gas turbine and jet plants.

25052 **APTIC NO. 46423**

THE CHANCES FOR THE ELECTRIC DRIVE. *(Die Chancen des Elektroantriebs). Text in German. Umwelt (Duesseldorf), 2(4):31-33, Aug./Sept. 1972.*

For passenger cars the electric drive is still far out of reach simply because it is too expensive. Moreover, it would bring no relief to cities congested by dense traffic. In the Federal Republic of Germany all efforts are concentrated on the development of electrically driven buses and small trucks. Apart from the fact that the electric car has no polluting exhaust gases, it has little to offer which would make it compatible with the combustion engine. A comparison of the fuel costs of a combustion engine with the power costs of an electric drive on the basis of a consumption of 14 l/100 km and a fuel price of 20 cents/l shows that the fuel price for a conventional drive is 2.8 cents/km for the electric drive charged at home it is 6.9 cents/km and 7.68 cents/km if the battery is replaced at a service station and charged there. The latter costs can be lowered to 3.2 and 4.3 cents/km at mass production. For public transportation vehicles, the electric drive stands a good chance since most of these vehicles cover only about 50 km/day.

25053 **APTIC NO. 46452**

THE KLOECKNER HUMBOLDT DEUTZ BUSES. *(Aus dem KHDO-Omnibusprogramm). Text in German. Automobiltech. Z. (Stuttgart), 74(9):379-381, 1972.*

The Kloeckner Humboldt Deutz A G. developed a new series of buses which produce low pollutant emissions. The standard equipment of the bus comprises an engine with direct injection and 176 hp which is air cooled by axial blowers. If desired, the engine can be installed with two-stage combustion and 180 hp. It has two turbulence chambers in the piston. With a lack of oxygen in the turbulence-chamber, a lower concentration of oxides of nitrogen develops. Due to the hot wall of the combustion chamber and great turbulence, odors, such as aldehydes, do not form. During main combustion, the turbulence is maintained. Combustion takes place with high air surplus at a relatively low temperature. In the 13-step California cycle the following pollutant emissions were measured for the Deutz engines: hydrocarbons and nitrogen oxides, 5.5 g/hp/hr for two-stage combustion; 8.5 g/hp/hr for the diesel engine with direct injection; and 9.0 g/hp/hr for gasoline engines with direct engine. These results were obtained with series produced engines. With a test engine with two-stage combustion, the HC plus NOx emission was only 4.8 g/hp/hr. The carbon monoxide emission by series produced two-stage combustion engines was 1.2 g/hp/hr; by diesel engines with direct injection 4.0 g/hp/hr; and by gasoline engines with direct injection 3.5 g/hp/hr. The CO emission of a test engine with two-stage combustion was 2.0 g/hp/hr.

25054 **APTIC NO. 46736**

North Atlantic Treaty Organization, Expert Panel for Air Quality Criteria

AIR QUALITY CRITERIA FOR CARBON MONOXIDE. *No. 10. 282p., June 1972. 291 refs.*

The occurrence, properties, and fate of atmospheric carbon monoxide and its effects on plants and animals are reviewed. Carbon monoxide is emitted by combustion, motor vehicles, aircraft, power generation, industrial processes, solid waste combustion, and natural sources, and is removed from the atmosphere by chemical reactions in the atmosphere, oxidation in the stratosphere, biological and biochemical reactions, and adsorption in oceans and on surfaces. Recent national and regional emission levels are listed. The measurement of CO and calibration methods are discussed including continuous and intermittent, nondispersive infrared, electrochemical, mercury vapor, gas chromatographic, catalytic, spot sampling, and colorimetric methods. Diurnal, seasonal, and annual variations in CO are mentioned. Meteorology, diffusion, and urban areas also affect CO concentrations. The effects of CO on plants and microorganisms are described. Carbon monoxide causes the formation of carboxyhemoglobin in the blood which can be measured by spectrophotometry, detector tubes, and gas chromatography, among other methods. The effects of CO on the central nervous system, cardiovascular system, myoglobin, and cytochrome oxidase enzymes are mentioned, and effects under conditions of high altitude and elevated pressure are discussed. Adaptation is noted. An epidemiologic appraisal of CO is given including community and residential exposures, occupational exposures, smoking, mortality and morbidity studies, sensitivity, and the relation of CO to motor vehicle accidents.

25055 **APTIC NO. 46779**

ARE WET/DRY COOLING TOWERS THE ANSWER? Elec. World, 178(6):80-83, Sept. 15, 1972.

Combination towers that provide both evaporative-cooling and dry-cooling capacity make it possible to control vapor plume discharge from power plants and to cut annual water consumption. Wet/dry towers draw ambient air through both the dry and wet sections in parallel paths; the air streams converge and are mixed, either immediately above the tower or in a plenum within the tower design. Water to be cooled is passed through the dry section and then through the wet section. Proper ratio selection of dry to wet portions is important to eliminate visible plume while optimizing economic advantages. The dry surface coil face area may range from 1/3 to 1/2 of the wet cooling section air inlet area. Parallel-path systems can be designed to limit maximum back pressure to 5 in. hga during the peak dry-bulb day and can be arranged for total air-cooled operation below a preselected design dry-bulb temperature ranging from 30-70 F. The annual water requirement may be reduced to as little as 15% of that for conventional wet towers.

25056 **APTIC NO. 46976**

Angelini, A. M.

ELECTRIC POWER AND ENVIRONMENT. *(L energia elettrica e l ambiente). Text in Italian. Elettrotecnica, 59(7):665-690, July 1972.*

Ecological problems connected with the production of energy and research activities designed to find solutions to these problems are reviewed. In Italy, 40% of the electric power in 1969 was produced by hydroelectric power plants which are non-polluting, the balance from polluting thermal power plants. Nuclear power plants in 1980 will furnish 15% of energy and in 1990 about 60%. Only 20-25% of all fuels are used to produce electric power. The amount of fuel required to produce 1 kWh dropped two and a half times since 1920, and thus also the quantity of pollutants emitted into the atmosphere. Radiation emitted by a nuclear power plant does not exceed 5 millirem/year for an individual within reach of its emissions, which represents no hazard. The heat generated by nuclear plants which is transmitted to cooling water could present an ecological problem since 100 000 kW require 3-3.5 cu m cooling water which is returned to its source in a heated state. The problem can be solved by cooling such water and by its dispersion. In Italy this is not an acute problem because most power plants including nuclear ones are and will be located on the sea coast. The choice of sites of thermal and nuclear power plants greatly influences the ecological impact of these plants and an ecological impact study always precedes any other decision. Demographic, topographic, land use, geology, tourism, and other pertinent data are considered in an ecological impact study. Pollutants emitted currently by electric power plants in Italy including particulates, carbon monoxide, hydrocarbons, sulfur dioxide, and nitrogen oxides.

25057 **APTIC NO. 46569**

Atoyan, K. M. and N. V. Gulia

PERSPECTIVES OF NEW TYPE MECHANICAL POWER UNITS FOR AUTOBUSES. *(Perspektivy ispol zovaniya novykh tipov mekhanicheskikh agregatov dlya avtobusov). Text in Russian. Avtomob. Prom., 38(7):40-42, 1972. 7 refs.*

Developments in the field of storing mechanical energy by means of flywheel arrangements, to be used primarily for buses in city traffic, are reviewed. A gyrobus equipped with a gyroscopic battery, by the Swiss firm Oerlikon, had a recharging cycle of about 2 km at high cost, low specific capacity, and low efficiency. Another gyrobus, developed by the Lockheed Co., is charged during operation, and can run up to about 50 km without main supply. The flywheel weighs slightly more than 300 kg. Another flywheel arrangement of plastic, weighing about 40 kg, is used in a passenger car that can cover distances up to 180 km. Hybrid flywheel-internal combustion engines and flywheel-electric battery systems are being studied.

25058 **APTIC NO. 46893**

Beall, John V.

MUDDLING THROUGH THE ENERGY CRISIS. *Mining Engineering, 24(10):41-48, Oct. 1972. 4 refs.*

There could be adequate electricity after 1975, but the United States will suffer the disadvantages of dependence on foreign supplies for liquid and gaseous fuels. This situation could be ameliorated by changes in policy. However, between now and 1985, the energy problem could turn into a capital one. One estimate is that $600 billion will be needed for new oil and gas production, transportation and refineries, coal production and transportation, nuclear production and processing, oil from shale syngas plants, electric power plants, and transmission lines. Price control, environmental concern, and bureaucratic delays are some of the causes for the energy crisis. The energy market is discussed, including coal, petroleum, natural gas, nuclear energy, hydropower, and the electric utilities.

25059 **APTIC NO. 46675**

Beliy, V. M. and V. I. Vinogradov

SULPHUR ISOTOPE COMPOSITION AND THE PROBLEMS OF GENESIS OF HIGHLY CONCENTRATED HYDROGEN SULPHIDE GASES OF OIL AND GAS BEARING AREAS. *(Izotopnyy sostav sery i voprosy genezisa vysokokontsentrirovannykh serovodorodnykh gazov neftegazonosnykh oblastey). Text in Russian. Geol. Nefti Gaza, no. 7:37-41, July 1972. 7 refs.*

The sulfur isotope composition and problems of the formation of hydrogen sulfide in an oil and natural gas bearing area in the USSR are described. The sulfate S(34) isotope content in stratal waters and anhydrites, determined against troilite as a reference standard, ranges from +10.1 to +25.1 pro mille. The high mobility of sulfate ions with the S(32) isotope corresponds to increased reactivity of such ions compared to sulfate ions with S(34) isotope, which results in increased S(32) concentrations in H2S. Evaporite sulfates were determined as the source of highly concentrated H2S gases which are formed in the process of dissolution and consecutive reduction of the sulfates by organic matter with the rate of reduction exceeding the rate of dissolution. The S(34) isotope concentration in such highly concentrated H2S gases varies from zero to +20.0 pro mille, and varies from +13.4 to +18.2 pro mille in the present case. The H2S content in the gas reaches 5%.

25060 **APTIC NO. 46928**

Berge, Heinz

THE USE OF LIQUID NATURAL GAS. *(Einsatz von Fluessigerdgas). Text in German. Gas Wasserfach, Gas Erdgas (Munich), 113(10):499-504, 1972. 3 refs. (Presented* *at the Conference of German Gas and Water Experts, Stuttgart, West Germany, May 17, 1972.)*

A detailed description of the experiences gained during construction and operation of the first storage plant for liquefied natural gas (LNG) in Stuttgart is given. With tank trucks the LNG is transported to the consumers. The availability of compressed LNG will promote the use of this fuel for automobiles. The LNG engine operates with a relatively lean fuel/air mixture. The fuel to air ratio can be much better regulated with natural gas than with the gasoline of the otto or diesel engines. The natural gas engine operates quietly since it has good antiknocking properties without requiring the addition of tetraethyl lead. Compared to the gasoline-operated engine, the carbon monoxide concentration of the exhausts is almost 90% lower. Much lower quantities of hydrocarbons and oxides of nitrogen are emitted and the soot smoke of the diesel engine is entirely avoided with natural gas. Tests with an automobile have shown that 200 cu m of compressed LNG which is equivalent to 190 l of diesel, can be carried in the tank. During parking of the automobile in a garage, some liquid evaporates, so that the tanks must be designed for the maintenance of an overpressure.

25061 **APTIC NO. 46837**

Bohn, T.

PROBLEMS OF FUTURE POWER SUPPLY. *(Probleme zukuenftiger Energieversorgun). Text in German. Brennstoff-Waerme-Kraft, 24(10):378-384, 1972. 19 refs.*

After the year 2100 energy consumption will have risen to 10 to the 22nd power Jouls/yr (200 MWh/a) which will lead to a global temperature increase by 1 K. In the Federal Republic of Germany, presently somewhat more than 0.25 times 10 to the 9th power tons of fossil fuels are burned. The carbon dioxide concentration of the atmosphere rises steadily (almost 1 ppm/yr) due to the combustion of fuels, which also raises the temperature. But no final verdict can be rendered on the effect this will have eventually. The higher atmospheric sulfur dioxide concentration and its connection with a higher mortality rate are known facts today. Moreover, it could be confirmed that SO2 destroys buildings and artifacts. The acidification of the water bodies is one effect whose possible dangers are not known today. Not quite so harmful as SO2, is nitrogen dioxide. In some areas it leads to the formation of smog and causes respiratory troubles. Other effects of fossil fuel combustion on the environment are the reduction of the oxygen concentration and the emission of dust which reduces the atmospheric transparency. Nuclear power plants influence the environment very little. But the danger will increase from the middle of the next century onward when exclusively nuclear power plants will be in use. But regardless of this nuclear power plants, preferably nuclear fusion should replace the fossil fuel operated power plants as soon as possible.

25062 **APTIC NO. 46440**

Boie, Werner

THE COMBUSTION TEMPERATURE IN NATURAL-GAS-FIRED SYSTEMS. *(Die Verbrennungstemperatur bei Erdgasfeuerungen). Text in German. Energietechnik, 22(9):422-426, 1972. 5 refs.*

Natural gases will be preferably used as a fuel in the future. For natural gas combustion, a high combustion temperature is essential. Despite the use of simplified formulae, the computation is lengthy and complicated. The simplest method is the following: First the enthalpy of the flue gas without air preheating is determined from a graph dependent on the heating value or the combustion heat with the air-fuel ratio and the oxygen content of the flue gas as parameters. The graph also shows the air demand of the flue gas/volume unit and the carbon dioxide concentration. In a second graph, the enthalpy is shown of the combustion air referred to the cu m flue gas (O C, 760 torr) dependent on the temperature of the preheated combustion air and the air demand of the flue gas/volume unit. In a third graph, the relationship of the flue gas temperature (combustion temperature at adiabatic combustion) and the enthalpy is shown with the CO2 content as a parameter. The combustion temperature can be determined with the aid of these three graphs without computation. A fourth graph is given to show the influence of the air temperature on the combustion temperature at a fuel-air ratio of one.

25063 **APTIC NO. 46919**

Christoph, K., W. Cartellieri, and U. Pfeifer

THE EVALUATION OF THE ANTI-KNOCKING PROPERTIES OF FUEL GASES BY THE METHANE NUMBER AND THEIR PRACTICAL APPLICATION WITH GAS- DRIVEN ENGINES. *(Die Bewertung der Klopffestigkeit von Kraftgasen mittels Methanzahl und deren praktische Anwendung bei Gasmotoren). Text in German. Motortech. Z. (Stuttgart), 33(10):391-403, 1972. 23 refs.*

Most of the gaseous byproducts from the mineral oil and petrochemical industry, as well as the sewage gases from purification of industrial and communal waste waters have idel properties for combustion in an engine. Gas-driven engines can be used for city buses. They operate with less noise and lower exhaust gas pollution than diesel engines. The economic use of gaseous fuels depends to a large extent on the ignition and combustion properties of the fuel as well as on the antiknocking properties. For a number of gases and gas mixtures (e.g., ethane, methane, ethylene, and propane) the methane number was determined on a CFR/RDH engine. Based on the empirical relationships among more component-gas-mixtures, an approximative method for the calculation of the methane number of a gas mixture from its chemical analysis was developed. For two engines of various size (the engine JW 40 GO was a two-cylinder engine with 125 mm diameter times 145 mm, the larger engine MWM G 348 E was a single cylinder with 320 mm diameter times 480 mm) the methane number required for avoidance of knocking was determined. A method for determining the required methane number for gas engines was derived.

25064 **APTIC NO. 47026**

Clemow, C. J.

PLANNING FOR RAILWAY ELECTRIFICATION. *Proc. Inst. Elec. Engrs. (London), 119(4):431-440, April 1972. 3 refs.*

In order to provide a report to management on comparisons between the proposal and alternative courses of action, the preparatory stages that should be followed before a decision to proceed with railway electrification are described. Consideration is given to capital and maintenance costs, performance characteristics, commercial appeal, train-service quality, levels of utilization, fuel costs, track, signalling, politics, and environment. Alternatives to electric traction are diesel and gas turbine propulsion. Discounted-cash-flow appraisal is described. The position of British Railways relative to other undertakings is indicated, and it is suggested that further electrification could be justified. (Author abstract modified)

25065 **APTIC NO. 46892**

Conwell, Cleland N.

ALASKAN COALS MAY PROVE A BIG PLUS IN FUTURE EXPORTS PICTURE. *Mining Engineering, 24(10):82-84, Oct. 1972. 9 refs.*

Coals are found in all parts of Alaska, ranging in geologic age from Carboniferous to Tertiary, and grading from lignite through anthracite. Only the Matanuska and Nenana coal fields have been extensively developed. Both these fields are discussed, in addition to the Bering River field, the Susitna field, and the Northern coal field. Other major fields are mentioned. The market for Alaskan coals, mining costs in Alaska, and land ownership are considered. The present major markets for Alaskan coal are in the interior region for thermal power plants. There are several reasons to forecast an increasing demand for Alaskan coal: low sulfur content of the subbituminous and bituminous coals; the demand for metallurgical grade coals; competitive cost of coal at the point of consumption; and a low population density.

25066 **APTIC NO. 46905**

Daniels, Farrington

THE SOLAR ERA. PART 2 -- POWER PRODUCTION WITH SMALL SOLAR ENGINES. *Mech. Eng., 94(9):16-19, Sept. 1972. 4 refs.*

Small solar engines and generators can now be built for about $1000/kw compared with $200/kw in large conventional installations, but the cost is low enough to justify further research and exploration. The need for solar engines is urgent because of the impending shortage of power, the increase of population and overcrowding of cities, and the need to reduce air pollution. Stationary flat-plate collectors of solar radiation are cheaper than focusing collectors, and they utilize both diffuse and direct radiation. They can operate large engines; however, they do not usually give temperatures above 100 C, which limits the engines to rather low efficiences. Movable focusing collectors are more expensive and can give temperatures of 500 C and a high efficiency of conversion into mechanical or electrical work. At present, focusing collectors are better than flat-plate collectors. Small solar Stirling hog-air engines have been built. Hot air turbines or high-boiling vapor turbines operating at temperatures over 200 C may be built. The focusing collectors can deliver heat to a target with an efficiency of 65% and can raise the temperature to 500 C on a target about 3 m in diameter. Several automatic or semiautomatic devices have been developed for keeping sunlight focused on the engine. A solar generator might produce power for 1.4 cents/kwh. Heat and power from solar energy could be stored in pebble beds and storage batteries, respectively. Another way of storing power is to produce hydrogen by the electrolysis of water: the hydrogen can be used as a fuel for internal combustion engines or fuel cells.

25067 **APTIC NO. 46692**

Davis, J. A., G. P. Dahn, and D. E. Price

LOW-POLLUTION, GAS-FIRED CUPOLA COMPLETES PILOT RUN TESTS. *Mod. Casting, 62(3):48-50, Sept. 1972.*

A vertical-stack gas-fired melting furnace, similar in geometry to a cupola, was tested on both laboratory and pilot run projects. The results of the tests, test programs, equipment, fuel costs, and advantages and disadvantages of the system with respect to metallurgy, costs, and air pollution are reviewed. No air cleaning equipment is necessary if the charge materials are clean. The effluent gas from the melter meets all existing 1971 and early 1972 particulate emission standards when charged with grit-blasted scrap. With a clean charge, the total particulate emission was 4.0 lb/hr for a process weight of 6.5 t/hr of iron. No visible smoke or fume was emitted in the stack gas.

25068 **APTIC NO. 46396**

Dawson, John E.

GAS TURBINES THRIVING ON CRUDE OIL. *Elec. World, 178(5):38-39, Sept. 1, 1972.*

With increasing use of gas turbines for longer-duration loads, and with decreasing availability of natural gas and no. 2 distillate fuels, interest in residual and crude oil is increasing. Four crude-oil packaged gas turbines were installed at a steam plant outside St. Petersburg, Fla. A special fuel oil treatment and forwarding system transports the oil to gas turbines which fire the crude oil using high pressure air atomization at the burners. The system was designed for automatic, unattended operations. The turbines can be run continuously if required, with a substantial fuel savings when using crude oil.

25069 **APTIC NO. 46691**

Dawson, L. G. and T. D. Sills

TURBOFAN TRENDS FOR SHORT HAUL. *Preprint, American Society of Mechanical Engineers, New York, 12p., 1972. (Presented at the American Society of Mechanical Engineers, Gas Turbine and Fluids Engineering Conference and Products Show, San Francisco, Calif., March 26-30, 1972, Paper 72-GT-86.)*

After a general indication of the noise problem around airports, the relation between conventional and short takeoff and landing systems are broadly reviewed and their powerplant requirements are discussed. Some of the associated technical challenges are considered, including variable pitch fans, reduction gears, thrust reversal, and the environment (noise and pollution). The pollutants exhausted by the aero gas turbine are mainly particulates and oxides of nitrogen at takeoff conditions and partially reacted fuel and carbon monoxide at engine idle. (Author abstract modified)

25070 **APTIC NO. 46435**

Dietz, H., H. Jannke, and H. Reber

STUDIES ON ELECTROCHEMICAL ENERGY SOURCES. PART 2. *(Onderzoekningen op het gebied van elektrochemische energiebronnen. 2 (slot)). Text in Dutch. Elektrotech. Elektron., no. 15:507-510, July 1972. 6 refs.*

Recent studies of electrochemical energy sources and new fuel cells are described. Catalysts for hydrogen, hydrazine, and formaldehyde are reviewed. Wolfram carbide in sulfuric acid and ferrophthalocyanine polymer, to be used for the reduction of oxygen in acid electrolyte, are among the catalysts developed recently. Methanol, representing considerable advantages due to the low costs and weights involved, requires a platinum catalyst for anodic oxidation, which urges studies of new catalysts for the anodic oxidation of methanol. A self-regulating 100 Watt-methanol-oxygen fuel cell is described. Methanol is mixed with alkaline electrolyte (6n-potassium hydroxide), and one of the fuel electrodes is made of platinum; the oxygen electrode is composed of two layers of sintered nickel powder of different porosity with silver as a catalyst. A special highly active catalyst for the oxidation of methanol in alkaline electrolyte at temperatures below 100 C has been developed (palladium ruthenium alloy with large specific inner surface, good electric conductivity, and high chemical resistence). The fuel cell battery has an efficiency of about 50% at 100 W output, and can be overloaded by up to 50% for short periods. Another 50 W-methanol-air fuel cell uses a two-layer cathode especially designed for air oxygen (hydrophobic teflon and partially hydrophobic, highly conductive layer with silver as catalyst). Experiments with this cell were successful within a temperature range of -30 to +50 C. The practical application of fuel cells requires the development of non-noble metal catalysts capable of converting electrolyte-soluble fuel or oxygen in sulfuric acid solution.

25071 **APTIC NO. 47061**

Dobbs, C. G.

FLUORINE, THE FAVOURED POLLUTANT. *Protectio Vitae, no. 3:105-109, 1972. 37 refs.*

The annual average fluorine content in rainwater of 0.16 mg/l was raised to a range varying from 0.28 mg/l to 10 mg/l in the neighborhood of industries using fluorine. Test plants with a normal F-ion content of 7-15 mg/kg dry weight could have had as much as 500 to 1850 mg/kg in the polluted areas. Also, a direct correlation between the F-ion level in the rainwater and in the test plants was found. A much higher F-ion content in food plants such as lettuce, leeks, parsley, and various fruits grown in industrial areas was found. The hazards of pollution are of two main types intensive and extensive. The intensive type usually causes acute and visible damage which result, eventually, in some sort of action to eliminate it. Unfortunately, the action often consists in the transformation of intensive into extensive pollution, as with the high stack policy. All it did was to spread the pollutant over a wider area where its effects will be more difficult or impossible to distinguish from those of other factors. A case in point is the large aluminum plant near Holyhead in North Wales. At the Public Enquiry in 1968 the estimated total emission was 928 lbs/day of fluoride. By 1970 this amount had risen to 1436 lbs. The stack was raised from 300 ft to 400 ft and provided with an additional rise from an internal hot pipe from the anode plant.

25072 **APTIC NO. 46934**

Emminger, H.

PLASTICS - PACKINGS - ENVIRONMENT PROTECTION. *(Kunststoffe - Verpackungen - Umweltschutz). Text in German. Gummi, Asbest, Kunstst., 25(10):944-948, 1972. 8 refs.*

Sixty percent of plastics consist of polyolefins, 12% of polystyrol, and 12% of polyvinyl chloride. The problem of harmful emissions when burning plastics in refuse incineration plants is not as important as it always seems. Polyolefins form vapor and carbon dioxide when being burned. Only polyvinyl chloride forms gaseous hydrochloric acid when combusted. However, for the time being, human health is not endangered by burning PVC because only when burning ten times the actual polyvinyl chloride quantity, namely 6.5% of the total refuse, would the health hazard be reached.

25073 **APTIC NO. 46709**

Guzdyuk, V. I., B. S. Belosel'skiy, A. D. Gorbanenko, V. I. Bakhirev, and R. S. Tsuprova

GENERATION OF SULFUR TRIOXIDE DURING SULFUROUS MAZOUT COMBUSTION AS AFFECTED BY THE OPERATING PARAMETERS. *(O vliyanii rezhimnykh faktorov no obrazovaniye sernogo angidrida pri szhiganii sernistogo mazuta). Text in Russian. Teploenergetika, no. 8:28-31, 1972. 8 refs.*

Factors influencing the formation of sulfur trioxide during sulfurous mazout combustion were investigated. The conversion of sulfur dioxide into SO_3 is mainly due to atomic oxygen formed in the high temperature zone of the flare as a result of the thermal dissociation of excess oxygen or oxygen-containing molecules. The SO_3 concentration in the combustion products is dependent on the sulfur content in the mazout, the excess air coefficient, and the final temperature at which the combustion reaction is completed. The higher this temperature, the lower is the SO_3 concentration in the combustion products. The formation of SO_3 outside the flare is counteracted by the reduced rate of atomic oxygen formation. Slight increase in the excess air coefficient from a small absolute value causes an abrupt increase in the SO_3 concentration, but this effect is subdued by high final temperatures. Slight increases in the excess air coefficient from a low value may also cause reduced SO_3 formation sometimes. The relation between the excess air coefficient and the rate of SO_3 formation is influenced by the conditions of the cooling and combustion of the tail zones of the flare. Corrosive SO_3 concentrations from the combustion of sulfurous mazout at low excess air coefficients may be due to relatively low temperatures in the peripheral zones of the flare.

25074 **APTIC NO. 47063**

Haase, Martin

THE EXPANSION OF THE BEWAG POWER PLANT MOABIT. *(Die Erweiterung des Bewag-Kraftwerks Moabit). Text in German. Energie (Munich), 24(10):237-248, Oct. 1972. 9 refs.*

The Bewag power plant Moabit was built in the year 1900 with a capacity of 7200 kW. In 1953 the old units were torn down and replaced by new ones and the capacity was expanded to 206 MW. The design, construction, and first operating experiences with three new 17 MW gas turbines are discussed. The gas turbines were designed to cover peak power demands. Light fuel oil is used with a maximum sulfur content of 0.8%. A Bacharach number two is maintained in the flue gas. The waste gases enter the 50 m high stack with a temperature of 500 C. A waste gas heat exchanger can be installed at a late date in the stack for use of the waste gas heat for remote heating. The electrostatic precipitators installed in 1957 and 1958 for two of the steam generators have become outdated. The dust concentration in the cleaned gas is too high and does not fulfill the demands put forth in the Technical Directives for the Maintenance of Clean Air. Minor modifications of the electrostatic precipitators did not bring any improvement. An expansion of the precipitators thus is planned.

25075 **APTIC NO. 47066**

Hauschildt, H. and G. Gorzitza

INFLUENCE OF THE FUEL OIL-EL-QUALITY ON THE OPERATION OF BURNERS WITH HIGH PRESSURE ATOMIZATION. PART II. *(Einfluss der Heizoel-EL-Qualitaet auf den Betrieb von Hochdruckzerstaeubungsbrennern. Teil II.). Text in German. Oel Gasfeuerung, 17(11):894-902, 1972. Part I. 17(10):798, 1972.*

For determination of the general validity of the equations derived in Part I, further experiments were carried out with different oil qualities. Also, the influence of the combustion chamber geometry on the burner sensitivity at a change of the oil quality was studied. Two types of fuel oils were used with an aromatics concentration of 23.8% by weight and 33.9%, a density of 0.820 g/ml and 0.853 g/ml (at 15 C), and a viscosity of 2.70 c St and 5.86 c St. Two high pressure atomization burners were used with oil throughputs of 2-3.5 kg/h (A) and 1.3-5.2 kg/hr (B). The experiments were performed in a fire-tube boiler and a sectioned cast iron boiler. Burner B exceeded the soot number three in the fire-tube boiler when the oil throughput rose above 4.0 kg/hr, while burner A did not exceed the soot number three upon oil quality changes. In the cast-iron sectioned boiler, the burners reacted more sensitively to oil quality changes when the combustion chamber was lined. While with burner B the combustion was still satisfactory, the soot formation exceeded the maximum allowable limit with burner A. The sensitivity of high pressure atomization burners differ within the burner capacity range at oil quality changes. The equations are thus valid only for the underlying test conditions.

25076 **APTIC NO. 46393**

Helmenstein S. and F. Martin

PLANNING CRITERIA FOR INCINERATORS. *(Planungsgrundlagen fuer Muellverbrennungsanlagen). Text in German. Mitt. Ver Grosskesselbetr., 52(4):333-340, Aug. 1972. 12 refs. (Presented at the VGB Conference on Incineration, Essen, West Germany, April 18, 1972.)*

Incineration causes the largest reduction of volume of all disposal methods, gives harmless residual matter, can use waste heat and residues, and is easily sited. Larger incineration plants operate more economical than smaller ones. For incinerators coupled with power production, the investment costs drop with the 0.4th power of the size ratio. The transport costs tend to rise with the increasing size of the plant. The optimum between specific annual costs and transport costs centers around a throughput of 400,000 t/yr. After a brief review of the various types of refuse and their essential properties, the utilization of the waste heat is discussed. The simplest method of using the waste heat is the supply of steam to chemical plants, refineries, and power plants. The use of waste heat for remote home heating has the drawback of the seasonal fluctuation of demand. Additional facilities for cooling with water or air are necessary. The best solution is the use of waste heat for power production plus remote heating. The vicinity of consumers for the waste heat, the length of the transport paths for the collection vehicles, and aspects of environment protection are decisive for the selection of a site.

The latter is important nowadays, despite the fact that incinerators are rather minor air-polluters. Of the four million tons of sulfur dioxide emitted each year in the Federal Republic of Germany, incinerators cause 0.06 ppm.

25077

APTIC NO. 46690

Hess, W. and M. Zimmermann

THE SULFUR DIOXIDE OF THE AIR A SWISS GROWTH PROBLEM. *(Der Schwefeldioxidgehalt der Luft als schweizerisches Wachstumsproblem). Text in German. Chem. Rundschau (Solothurn), 25(43):1363-1365, 1972. 16 refs.*

Sulfur dioxide is primarily a product of the combustion of sulfur-containing fuels. Thus, more SO2 is emitted in urban areas than in the open countryside. a close relationship exists between fuel consumption and SO2 emission, which is higher in winter than in summer. In Switzerland, fuel oils have widely fluctuating sulfur concentrations. In 1962 the sulfur fraction in light fuel oil fluctuated between 0.13 and 1.03%, in medium heavy fuel oil between 0.72 and 3.18%, and in heavy fuel oil between 0.70 and 3.5%. In 1971, the sulfur concentrations in fuel oil were more or less the same as those reported for 1962, only the peak values were lowered. However, the emission of SO2 rose which shows that the reduction of the sulfur concentration in the fuel is a rather inefficient method of reducing sulfur dioxide emissions. The increase of the sulfur-containing fuel consumption has a much greater influence. The tolerance limits for sulfur dioxide in Switzerland are much higher than those of the United States; for instance, 24-hour values of 0.86 mg SO2/cu m for the winter months and of 0.57 mg SO2/cu m for the summer months are tolerated in Switzerland. No improvement of the present SO2 pollution of the atmosphere in Swiss cities, can be expected in the near future.

25078

APTIC NO. 46859

Hoffman, L., F. J. Lysy, J. P. Morris, and K. E. Yeager

SURVEY OF COAL AVAILABILITIES BY SULFUR CONTENT (FINAL REPORT). *Mitre Corp., Washington Operations, Environmental Protection Agency Rept. 2-72-022, MTR-6086, 157p., May 1972. 60 refs.*

NTIS: PB 211505

The present and possible future availabilities of coal by rank and sulfur content are quantified. Coal reserves and production and mining growth potentials are presented. The feasibility of physical cleaning and the potentials of Rocky Mountain strippable reserves to provide low-sulfur coal for central and eastern markets are also examined. Statistically, the maximum effect of applying the desulfurization process would be an increase in low sulfur steam coal production by 32 million tons annually, a 56% increase over present production at this level. The increase in production of coal with a maximum sulfur content of 0.7% by weight would be 17.6 million tons annually, a 107% increase.

25079

APTIC NO. 46558

Hoshino, Yoshiro

THE MAIN SOURCES OF ENVIRONMENTAL POLLUTION IN THE INLAND SEA AREA. *(Seto Naikai chiiki ni okeru shuyo na kankyo osengen). Text in Japanese. In: The Inland Sea - Report on General Investigations of Pollution. (Seto Naikai - osen sogo chosa hokoku). General Investigation Committee on the Inland Sea Pollution, Tokyo (Japan), p. 390-414, 1972.*

The main pollutant sources in the coastal areas of the Inland Sea are discussed by type of industry. Storage by the Fukuyama Plant of Japan Steel Pipe of approximately 23 million tons of iron ore, coal, and lime creates a tremendous amount of dust. The Mizushima Plant of Kawasaki Ironworks stores 15 million tons of material, and the nearby village of Takashima has a serious problem of dust pollution. The Fukuyama Plant produces approximately 24,000 tons of sulfur dioxide annually at its sintering plant from the iron ore alone. In addition, at least 650,000 tons of SO2 from coal and at least 40,000-50,000 tons from fuel pollute the area. A copper refinery plant that annually produces 100,000 tons requires 500,000 tons of copper and emits 20,000-30,000 tons of SO2. The principal air pollutant produced at an aluminum plant is hydrogen fluoride created during aluminum electrolysis. The Sumitomo Chemical Toyama Plant reportedly pollutes an area of 3-kilometer radius around the factory. The Mizushima Plant of Japan Mining produces approximately 21,000 tons of SO2 annually, and the Mitsubishi Petroleum Mizushima Plant produces 19,000 tons. Together with the thermal electric plants of the Chugoku Electric and Kawasaki Iron in the Mizushima area, the total SO2 emitted from the thermal electric plants in the Mizushima area is approximately 92,000 tons annually. The total sum of SO2 from the thermal electric plants and iron refineries is approximately 240,000 tons in the area.

25080

APTIC NO. 46394

Jester, Klaus

THE CONVERSION OF COAL-FIRED STEAM BOILERS TO OPERATION WITH NATURAL GAS - FURTHER EXPERIENCES WITH THE PLANNING, CONVERSION AND STARTUP. *(Die Umstellung Kohlegefeuerter Dampferzeuger auf Erdgasbetrieb - weitere Erfahrungen bei der Projektierung, Umstellung und Inbetriebnahme). Text in German. Energietechnik, 22(8):363-367, 1972. 2 refs. (Presented at the Waermetechnische Kolloquiums, 5th, Magdeburg, East Germany, Aug. 30-31, 1972.)*

The conversion of a coal-fired steam boiler to natural gas operation is discussed on the basis of experiences with two boilers, a 50 t/hr and a 32-t/hr steam generator. The 50-t/hr steam boiler possessed a sufficiently large combustion chamber for installation of a frontal gas-firing system with a five-tiered gas burner arrangement. In the 32 t/hr boiler the gas burners were installed on the side wall. Extensive calculations of the heat development in the boiler with the new firing system were carried out for both boilers. The grates of the old coal-firing system were not removed but protected by air cooling so that the temperatures in this area never rose above 50 C. The reason for this was the desire to be able to return to coal as fuel should the need arise. Practical operation has shown that the down-time of the boilers was far less than with coal-firing since no incrustations developed on the flue gas side. No more dust cleaning of the flue gas was required and no soot blowing was necessary. Experiences with natural gas as an auxiliary fuel in a coal-fired 80 t/hr steam boiler have shown that the loss of unburned gases increases with increasing substitution of coal by natural gas. The heat loss of the waste gas decreases with increasing substitution of the coal by natural gas.

25081

APTIC NO. 46714

Jones, T. R.

EFFLUENT TREATMENT AT MAN-MADE FIBRE PRODUCTION UNITS. *Effluent Water Treatment J. (London), 12(7):352-355, July 1972.*

The three major synthetic fibers in current production are nylons, acrylics, and polyesters. Their manufacturing processes, effluents, and control methods are indicated, in addition to effluents and control methods from the production of acetates and viscose rayons. In rayon production, carbon disulfide used in cellulose regeneration is liberated in gaseous form as CS2 or hydrogen sulfide. Even when the best practicable means are employed for CS2 recovery and H2S removal, effluent gases have a characteristic odor detectable in very low concentrations. Methods of removing the furfuryl mercaptan and similar odoriferous substances are being studied. Colored effluents which result from dyestuff are also mentioned. The recycling of water and accidental discharges are considered. As productivity rises, chemical costs tend to become a larger part of operating costs in general, which in turn tends to make recycling and recovery more financially attractive as raw material costs rise. The technologist therefore finds that increasingly his interests coincide with the environmentalists, and the problem of effluent treatment becomes more a question of prevention than cure.

25082 APTIC NO. 46979

Kanert, E.

THE IMPULSE BURNER KILN. A KILN WITH ADDITIONAL PERIPHERAL INJECTION OF HEAVY FUEL OIL. *(Der Impulsbrennerofen, ein Ofen mit zusaetzlicher peripherer Einspritzung von schwerem Heizoel). Text in German. Zement-Kalk-Gips (Wiesbaden), 25(10):478-480, 1972.*

The conversion of normal induce-draught kilns for lime burning to operate on the impulse burner principle is described. Since the heavy fuel oil, which is injected through nozzles installed peripherally, penetrates only to a depth of 0.8-1.0 m into the limestone charge, the inner part of the kiln must be charged with a limestone/coke mixture. This process, which has so far been in operation for only a few months, has resulted in technical improvements and a reduction in costs, while the reactivity of the lime burned by this method is higher. The waste gas temperature is also higher. It rose from 125/135 to 150/160 C. At the same carbon dioxide content of 32-34%, the carbon monoxide concentration in the waste gas went down from 2-3% to 1%.

25083 APTIC NO. 46426

Kobayakawa, Takashi and Hiromichi Kamiyama

FORMATION OF POLLUTANTS CONTRIBUTING TO PHOTOCHEMICAL REACTIONS, ESPECIALLY NOX AND HC. *(Kokagaku hanno ni kiyo suru osen busshitsu toku ni NOx, HC no hassei ni tsuite). Text in Japanese. Japan Society of Air Pollution, Proc. Japan Soc. Air Pollut., Meet. Air Pollut. Caused Photochem. Reaction, 1972, p. 259-265. 3 refs.*

A report from the Environmental Protection Agency showed that, in the USA in the year of 1969, 64.7% of the carbon monoxide, 45.7% hydrocarbon, and 36.6% nitrogen oxides in the environment were emitted by automobiles as exhaust gas, and 9.0%, 7.2%, and 10.5%, respectively by other means of transportation. In Tokyo in the year of 1967, 99.7% of the CO, 35.9% NOx, and 97.9% HC were emitted by automobiles. Due to the differences in road conditions and running limitations between the two countries it was suggested that different emission coefficients should be considered for the emission sources in Japan. A large area consideration of sources on photochemical reaction was recommended.

25084 APTIC NO. 46437

Kroon, D. J.

SYMPOSIUM, PHYSICAL ASPECTS OF THE ENVIRONMENT. I. INTRODUCTION. *(Symposium Fysische aspecten van het milieu. I. Inleiding). Text in Dutch. Ingenieur, 84(32/33):23-27, Aug. 1972. 12 refs.*

The environmental aspects of energy production are outlined. The increase in the energy production of the world during the past two decades has been highest in highly industrialized countries with 48% of the world's population consuming 84% of the total energy produced as a result. Fossil fuel-based energy production will be limited by the exhaustion of fuel resources, the production of chemical pollutants, and the production of waste heat. About half of the carbon dioxide originating in fossil fuels is present in the atmosphere, and the rest is used up for photosynthesis or absorbed by the ocean. Intensified energy production near densely populated areas may lead to climatic changes due to waste heat production. In power plants in the Netherlands, the cooling capacity nears the limits of the possibility. Appropriate siting of industries and nuclear power plants can permit the waste heat from such plants to be utilized. The reasonable use of energy will require increased efficiency of power generating and other industrial equipment, improved power transmission techniques, the manufacturing of long-life products, and improved building insulation. The limitation of the energy production is a potentiality.

25085 APTIC NO. 47022

Krummenacher, Theo

TENDENCIES AND COMMERCIAL POSSIBILITIES IN THE DEVELOPMENT OF ELECTRIC ROOM HEATING INSTALLATIONS. *(Tendenzen der Entwicklung und Erkenntnisse fuer den Absatz elektrischer Raumheizungen). Text in German. Elektrizitatsverwertung, 47(2):45-46, Feb. 1972. 4 refs.*

Oil-firing for hot water boilers in connection with central room heating has become the predominant system in many areas of the world, chiefly due to relatively favorable operating cost. With its modern automatic control, safety features, and practical as well as attractive radiator designs, its comfort can hardly be surpassed. However, environmental considerations now enter the picture. In Switzerland, 150 oil accidents have been reported within the 6-month period of July to December 1971, involving the loss of 500,000 l of oil. Such accidents contribute to ground water pollution. Due to the fact that even the best fuel oils contain up to 0.5% sulfur, oil-firing becomes a source of air pollution by sulfur dioxide. Electric heating would represent a definite improvement from an environmental point of view. Two typical examples of available types of electric heating systems are direct heating and hot water central heating. A determining factor for the investment cost for a storage heating system is the size of rated connected load. By planning on a controlled spread of current consumption over greater time units, the magnitude of the electrical installation and the operating cost can be kept at a reasonable level.

25086 APTIC NO. 46886

Lessing, Lawrence

THE COMING HYDROGEN ECONOMY. *Fortune, 86(5):138-142, 144, 146, Nov. 1972.*

In the search for alternative sources of power to meet the looming crisis in energy and the environment, a growing number of scientists and engineers have come to embrace a sweeping vision of how the problem may be solved by the end of the century. The vision involves moving by stages from an economy based on the hydrocarbons--coal, oil, and natural gas--to a pure hydrogen economy. On great floating platforms in the oceans, some number of miles offshore, a series of big nuclear power plants would be built. The electricity they produced would not be transmitted to the mainland, but would be used on the spot to decompose sea water into its main gaseous elements-hydrogen and oxygen--by passing a strong electric current through it, in a process known as electrolysis. On deep water, the nuclear plants would dissipate their excessive waste heat more rapidly and less harmfully than on shore, and they would bypass other dangers of siting nuclear reactors in populous land areas. The shift to a hydrogen economy is discussed in detail, including power in the home and hydrogen in the automobile.

25087 APTIC NO. 46821

Lommerzheim, Werner and Harry Hahn

A CONCISE TABULATION OF NOX MEASUREMENTS IN COMBUSTION GASES. *(Kurzmitteilung uber NOx-Messungen in Verbrennungsgasen). Text in German. Gas Wasserfach, Gas Erdgas (Munich), 113(8):397-399, Aug. 1972.*

Tests were made at many industrial heating installations, particularly natural gas-fired steam and hot water boilers, to establish the concentration of nitrogen oxides in the flue gases. For comparison, similar tests were carried out with installations using coke oven gas, coal, and fuel oil. All tests were based on the photometric phenol-disulfonic acid method, and check tests according to the photometric Saltzman method. Differences between the two sets of test results did not exceed plus/minus 10%. The sampling of gases was made at spaces after the boiler proper, particularly at the entry into the chimney, and at load conditions of under 80% of full load. Natural gas and coke oven gas showed considerably lower NOx contents than coal. Formation of NOx is not a problem tied in exclusively with the type of fuel used. The temperature pattern and the length of time during which the combustion products as well as the excess air remain inside the flame and in the high temperature zones of the heating installation are important.

25088 **APTIC NO. 46920**

Masek, Vaclav

NEW FINDINGS CONCERNING THE PROPERTIES OF FLY DUST FROM COKING PLANTS. III. PITCH COKING. *(Neue Erkenntnisse ueber die Eigenschaften des Flugstaubes aus der Kokerei. Teil III. Pechkokerei). Text in German. Zbl. Arbeitsmed., 22(9):276-281, 1972. 11 refs.*

Fly dust samples from the vicinity of a pitch coking plant were used for determination of the current potential, the contact catalytic influence on the hydrogen peroxide-dissociation, the sorption properties of original, hydrolyzed, and aged dusts, the gas vapor adsorption, the importance as a nutritive substance for plants, the influence on the inversion of sucrose by invertase, and the radioactivity. For determination of the current potential a standard chloride solution was prepared with which the dust samples remained in contact for three days. For the three samples, current potentials of plus 4 mV, plus 3 mV and minus 4mV were calculated. All samples were rather inactive catalytically primarily the sample from the upper part of the block. The original, hydrolyzed, and aged fly dust samples all had rather low sorption properties. The nutritive substances contained in the fly dust samples were liberated to a minor extent only in aqueous solutions. None of the dust samples influenced the enzymatic reaction of sucrose inversion by invertase. Thus the dusts found in the vicinity of pitch coking plants must indeed be counted as undesirable components of the atmosphere.

25089 **APTIC NO. 46974**

Masek, Vaclav

NEW OBSERVATIONS DERIVED FROM THE PHYSICAL-CHEMICAL STUDY OF SUSPENDED DUST IN A METALLURGICAL PLANT. *(Nove poznatky z fyzikalne-chemickeho studia poletaveho prachu v hutnim podniku). Text in Czech. Hutnicke Listy (Prague), 8:541-546, 1972. 11 refs.*

Some physico-chemical characteristics of samples of suspended dust collected in the agglomeration area of blast furnaces, steel works, and rolling mills were studied following determination of ash content, of granulation, and following thermogravimetric degassing in a stream of pure argon. The electric potential was measured on chlorine-silver electrodes in the Zhukhov apparatus. Contact catalytic properties were assessed from the velocity of hydrogen peroxide decomposition. Also, sorption characteristics were evaluated by means of the adsorption coefficient and adsorption exponent of Freundlich s equation. Ion exchange processes were followed from selectivity coefficients. Gas adsorption was determined with a Pouchly-Vavrucha instrument, vapor adsorption in a modified Timofejev instrument, and radioactivity by the NZQ 612 laboratory measuring set. Ion exchange was proportional to electric charges of the dust particles, quite dependent on dust sorption characteristics, and very close to contact catalytic effects on peroxide decomposition. From the point of view of sorption, the dust samples were amphoteric but aging, and hydrolysis increased their alkaline character. The dust samples tested adsorbed gases and vapors relatively moderately; their radioactivity was negligible. Overall the activity of suspended dust samples examined was, judged by the physical-chemical methods employed, low.

25090 **APTIC NO. 46826**

Matthess, G.

LEAD CONCENTRATIONS IN ROCKS, SOIL, AND GROUNDWATER. *(Bleigehalte in Gestein, Boden und Grundwasser). Text in German. In: Blei und Umwelt. Kommission fuer Umweltgefahren des Bundesgesundheitsamtes (West Germany), Arbeitsgruppe Blei, p. 21-27, 1972. 28 refs.*

The lead in rocks, soil, and groundwater stems from several sources which can be combined into two groups, natural lead concentrations and anthropogenic concentrations. After listing the natural lead concentration found in various rocks and soils of West Germany, The Netherlands, France, Great Britain, Spain, and the U.S.S.R., the anthropogenic lead concentrations are discussed. Studies in Scotland revealed a generally higher lead concentration in urban areas compared to rural areas. They are the consequence of air pollution by combustion processes, automobile exhaust gases, pesticides, and fertilizers. A local increase of the lead concentration in the soil near Langesheim/Lower Saxony to more than 1000 mg/kg was caused by the smoke from a metallurgical plant. Higher than normal lead concentrations are found along busy streets and highways. Analysis of the lead concentration of the soil in various distance from the Autobahn Giessen/Frankfurt revealed a rapid decrease with increasing distance. This section of the Autobahn had been used by about 40 million automobiles. It is estimated that 1.2 kg lead have been emitted/m of the Autobahn. In the separating strip between the two directions, 147 mg extractable lead/kg soil was measured; at a depth of 20 to 40 cm 25 mg/kg; on the side 130 mg/kg; at 20 m distance, 26 mg/kg; at 50 m distance, 23 mg/kg; and at 100 m distance 19 mg/kg.

25091 **APTIC NO. 46975**

Melino, Carmine

AIR POLLUTION GENERATED BY TRANSPORT EQUIPMENT. *(L inquinamento atmosferico da mezzi di trasporto). Text in Italian. Ing. Ferroviaria, 27(4):353-358, April 1972.*

Damage from pollution generated by railroads was estimated in 1967 to have amounted to $1,600,000. Aside from 16,242 km railroad tracks, Italy has 1872 railroad tunnels which are 950 km long. In 1944, 400 passengers died in one tunnel from carbon monoxide poisoning. In 1971 a study of tunnel micro-climate was performed in relation to tunnel length and traffic density; very high particulate pollution levels were found, especially in urban tunnels. Considerable air pollution is generated by urban railroad stations which add to urban background pollution. Very high CO levels (mostly from tobacco smoke) were found inside passenger railroad cars; sometimes 110 ppm was found. The heating installations of railroad stations represent a considerable source of air pollution and only recently were steps taken to reduce pollution from this source. Pollution from air traffic is of the order of 2-5% of the total air pollution; newer aircraft have pollution control equipment; thus, even though air traffic density has increased, pollution from this source has decreased by about 75% in the course of the last 20 years. Large airports with up to 3000 landings and takeoffs a day have grave problems with CO, nitrogen oxides, hydrocarbons, and smoke. Gasoline consumption from cars in Italy has increased from 4 million tons in 1962 to 9 million tons in 1969, and almost 50% of that weight reaches the environment in the form of air pollution. The problem is especially grave in urban highway tunnels, especially those longer than 500 m. Law No. 615 of July 13, 1966 dealing with pollution control from automobiles went into effect on Oct. 1, 1971 restricting the emission of CO and hydrocarbons. Other pollution control measures in force in Italy are reviewed.

25092 **APTIC NO 46775**

Menden, Edward E., Victor J. Elia, Leslie W. Michael, and Harold G. Petering

DISTRIBUTION OF CADMIUM AND NICKEL OF TOBACCO DURING CIGARETTE SMOKING. *Environ. Sci. Technol., 6(9):830-832, Sept. 1972. 15 refs. (Presented at the American Chemical Society, Central Regional Meeting, 3rd, Cincinnati, Ohio, June 1971.)*

Wet- and dry-ashed cigarettes, cigars, and pipe tobacco were analyzed for contents of cadmium and nickel. Values of 1.56 1.96 micrograms cadmium and 4.25-7.55 micrograms of nickel per cigarette and 0.93-1.86 micrograms per gram of cigar and pipe tobacco were determined. Only 7-10% of the cadmium and 0.4-2.4% of the nickel in the smoked portion of the cigarettes appeared in the particulate phases on the mainstream smoke; the remainder was present in the ash, trapped in the butt, or lost in the sidestream. About 38-50% of the cadmium and 11-33% of the nickel, therefore, are present in the sidestream, representing a health hazard to nonsmokers as well as smokers. (Author abstract modified)

25093 **APTIC NO. 46700**

Meszlery, Celesztin

ENERGETICAL STUDIES OF TILE GAS STOVES. *(Gaztuzelesu cserepkalyhak ho- es gaztechnikai vizsgalata). Text in Hungarian. Energiagazdalkodas, 13(7):310-318, July 1972. 12 refs.*

General problems of the design and the operation of tile gas stoves are reviewed with special regard to corrosion hazards. The volume of combustion products is required not to exceed 20% of the gas volume fired, and the waste gas temperature at the inlet throat of the chimney must not exceed 150 C to prevent condensation hazards. The relationship between the excess air coefficient, the operation duration, and the dew point is discussed. Increased excess air coefficient results in decreased efficiency and increased temperature of the combustion products, and hence reduced corrosion hazards. Corrosion processes in the chimney are due to condensation in the presence of carbon dioxide, with the carbonic acid thus formed attacking the mortar as a result. Major damage due to corrosion occurs mostly within the first two years of operation, mainly as a result of stoves operated extensively on low flame. Abandonment of low flame burner position, or the use of heat-insulated chimneys with reduced cross section area to prevent corrosion are proposed.

25094 **APTIC NO. 47048**

Moll, Walter

PROBLEM: REFUSE INCINERATION. *(Problem: Muellverbrennung). Text in German. Staedtehygiene (Uelzen/Hamburg), no. 10:236-237, Oct. 1972. 8 refs.*

According to recent investigations, the incineration of refuse can endanger human health. The incineration plant at Hamburg, for example, emits 6 million cu m of flue gases daily containing about 900 kg of very fine-grained dust. The dust particle surface absorbs metal chlorides and organic compounds causing cancer if the dust penetrates into the lungs. Besides the dust, great quantities of harmful gases like carbon monoxide, hydrochloric acid, heavy metal chlorides, and many organic compounds are emitted from incineration plants. These gases are only completely destroyed if burned at temperatures exceeding 1400 C, which, however, are not reached in incineration plants, since the linings of the furnaces would be seriously damaged. Polychlorinated biphenyls which are frequently used in hydraulics, constructional engineering, and as softener in lacquers raise a new problem since they are not decomposed by burning and have a dangerous biological effect when being emitted. Another great problem arises by the increasing production of substances containing fluorine, such as teflon, which forms highly toxic gases when being burned. Considering the problems connected with refuse incineration, emphasis should be laid on research work in the recycling and sanitary landfill field.

25095 **APTIC NO. 46903**

Mueller, Herbert and Otso Haahtela

THE INFLUENCE OF ELECTRIC IGNITION ON THE OPERATION AND EXHAUST GAS COMPOSITION IN THE OTTO ENGINE. *(Einfluss der elektrischen Zuendung auf Betriebsverhalten und Abgaszusammensetzung im Ottomotor). Text in German. Motortech. Z. (Stuttgart), 33(10):408-414, 1972. 19 refs.*

Various ignition systems (transistor, coil ignition, high voltage, and condenser ignition) and the parameters in connection with the ignition were studied with the aim of reducing the pollutant emission without negatively affecting the effective medium pressure and the specific fuel consumption. The experiments were performed on an air-cooled single cylinder engine BMW 403. For determination of the influence of the parameters connected with ignition, a fuel to air ratio must exist at the spark plug which can be calculated from the supplied air and fuel quantities. Prerequisite for this is the presence of a homogeneous mixture over the entire combustion chamber. Three mixing methods were studied in this connection, mixing with a simple carburetor, with the electronic Bosch injection and with gaseous fuel. The most homogeneous mixture was achieved with gaseous fuel. Thus all further tests were performed with gaseous fuel. Longer spark duration, larger electrode distance of the spark plugs, double sparks, and adequate spark succession are methods of increasing the fuel to an air/fuel ratio through which primarily the emission of the oxides of nitrogen can be reduced.

25096 **APTIC NO. 46444**

Nakadoi, Takashi

THE SIGNIFICANCE OF HYDROCARBONS AS AIR POLLUTANTS. *(Tankasuiso- rui no taiki osen busshitsu to shite no igi). Text in Japanese. Japan Society of Air Pollution. Proc. Japan Soc. Air Pollut. Meet. Air Pollut. Caused Photochem. Reaction, 1972, p. 249-258. 16 refs.*

The emission of hydrocarbons from various sources as an air pollutant and its concentration in air are discussed. Hydrocarbons are emitted from natural sources such as plants, oil fields, and natural gas, and as automobile exhaust. Measurements of total hydrocarbons conducted in the Osaka area from April 1970 to March 1971 showed a yearly average concentration of 0.97 ppm. The irradiation of a gas mixutre containing 2 ppm hydrocarbon and 1 ppm nitric oxide caused the formation of ozone and formaldehyde. Eye irritation is caused by these products. The yields of the products depended on the hydrocarbon used. The sequence of the hydrocarbon reactivity for O3 formation was internal olefins, 1,3-butadiene, multialkyl benzenes, terminal olefins, monoalkyl benzenes, paraffins, and benzene. Maximum allowable concentrations for various countries are mentioned.

25097 **APTIC NO. 46918**

Nomura, Katsumi

ON MERITS OF HEAVY OIL-GAS MIXTURE COMBUSTION WITH REGARD TO POLLUTION CONTROL. *(Kogai hassei no yokushi taisaku ni okeru juyu gasu konsho no meritto ni tsuite). Text in Japanese. Preprint, Japan Heat Management Assoc., Tokyo, p. 35-40, 1972. (Presented at the Conference of Japan Heat Management Association, 13th, Tokyo, Japan, Oct. 18-20, 1972. Paper 4.)*

Use of heavy oil-butane gas mixture as fuel for a smaller boiler was strongly suggested as an only possible solution to the two contradicting problems, lower fuel cost and lower air pollution, especially for a small scale industrial enterprise. If a fuel should meet such requirements as 1.0% sulfur content, 0.2 g dust content/N cu m of the emission gas, and 2.7 cents/10,000 Kcal in the fuel cost and if a fuel combustion system is to be readily adapted to future changes in the form of fuel or fuel combustion system, to provide low installation and running costs, and is to be easy to use, only the heavy oil-butane gas mixture combustion system meets all these conditions. The heavy oil-butane gas mixture combustion system can readily take a gas or gasified fuel. This system not only raises the combustion efficiency of heavy oil itself, but also greatly reduces the excess air ratio and brings down the fuel cost. Taking up a plant using 540 kl of fuel monthly in terms of heavy oil as an example, a comparison of the initial and anual running costs among various types of fuel was made.

25098 **APTIC NO. 47050**

Oelert, Henning H. and Th. Florian

DETERMINATION AND EVALUATION OF THE ODOR ANNOYANCE BY THE EXHAUSTS OF DIESEL ENGINES. *(Erfassung und Bewertung der Geruchsbelaestigung durch Abgase von Dieselmotoren). Text in German. Staub, Reinhaltung Luft. 32(10):400-407, Oct. 1972. 45 refs.*

The odorous components in diesel exhausts and methods for their estimation are discussed. Using a three person panel it is possible to evaluate intensities of exhausts in comparison with test components by dimensionless numbers. Complete relationships of odor intensities and modes of operation are demonstrated for a diesel engine. The odor intensity increased with the sum of aliphatic olefins (including acetylene) with one to six carbon atoms plus hydrocarbons with more than six carbon atoms. Odor intensity also increased with engine load and decreased with increased speed. The intolerance level dropped quite markedly with increasing aldehyde fraction. It can be assumed that the threshold limit and the intolerance level are strongly influenced by substances with molecular weights of more than 80. For odor avoidance, the mixture entry into the diesel engine and modification of the combustion process seem to be suitable methods. A list of odor threshold values found in the literature and by laboratory measurements of 234 substances is provided.

25099 **APTIC NO. 47041**

Palmer, T. J. and M. Vahrman

THE SMALLER MOLECULES OBTAINABLE FROM COAL AND THEIR SIGNIFICANCE: PART 3. STEAMING/CARBONIZATION OF A WEAKLY-CAKING COAL AT TEMPERAUTRES UP TO 600 C. *Fuel, 51(1):14-21, Jan. 1972. 12 refs.*

The technique of steaming coal for long periods at temperatures up to 600 C, collecting the total products made up to a particular temperature, and also, in a separate series of experiments, stepwise between temperatures within this range, enabled a fuller study to be made of the sequence of emergence of molecules, of their relations to each other and to the original coal, and of the geochemical significance of the hydrocarbons. A total of at least 5.3% of hydrocarbons was estimated to be present in the original coal. (Author abstract)

25100 **APTIC NO. 46450**

Rast, A. and H. Eckardt

THE POSSIBILITIES OF REDUCING THE VANADIUM CORROSION IN GAS TURBINES WITH ENTRANCE TEMPERATURES OF 800 C AT THE USE OF V CONTAINING HEAVY FUEL OILS. *(Ueber Moeglichkeiten zur Verminderung der Vanadium Korrosion in Gasturbinen mit Eintrittstemperaturen von 800 C beim Einsatz V-haltiger schwerer Heizoele). Text in German. Freiberger Forschungsh. A, no. 507:7-24, 1972. 9 refs.*

For economical reasons gas turbines are operated with cheap fuels such as the residual oils from mineral oil refining whose ash concentration may range from 100 to 1000 ppm. The undesired components of fuel oil ash are the vanadium pentoxide, which may amount to 80% of the ash, the sodium vanadates, and the sodium sulfate. At temperatures from 800 C onward, the Na2SO4 and the V2O5 begin to react with each other. The reaction can be relatively easily followed by determination of the liberated sulfur trioxide. The melting and corrosion properties of model fuel ashes were studied in the laboratory. The corrosion largely depended on the Na2SO4 concentration. The influence of additives on the corrosion process was studied by adding magnesium oxide, aluminum oxide, and silicon dioxide at a ratio of 0 to 30 mols additive/mol V2O5, and in the case of SiO2 0 to 50 mols SiO2/mol V2O3. The most efficient additive was the MgO. The SO3 corrosion is mentioned but not discussed.

25101 **APTIC NO. 46575**

Rikhter, L. A., I. B. Zasedatelev, and F. P. Duzhikh

INVESTIGATION OF THE OPERATION OF SMOKESTACKS WITH BACK PRESSURE IN NATURAL VENT CANAL. *(Issledovaniye raboty dymovoy truby s protivodavleniyem v estestvenno ventiliruyemom kanale). Text in Russian. Teploenergetika, no. 7:68-71, 1972. 6 refs.*

A new smokestack design in which back pressure is maintained in a natural draft air canal to prevent the reinforced concrete structure from corroding at discharge rates above 20 m/sec is described. The annular air canal is located between the shaft and the lining, with width reducing with height from 250 to 50 mm. The necessary temperature drop of 50 C in the lining and the back pressure are provided by bottom-mounted air heaters utilizing steam from one of the turbines. The operation in a natural draft regime with upper vent openings shut was found to be best. It is possible to maintain the back pressure even at maximum thermal load, and to abandon fans completely.

25102 **APTIC NO. 47001**

Robson, Fred L.

ELECTRIC POWER--VIA MARRIAGE OF CHEMICAL AND AEROSPACE INDUSTRIES. *Chem. Technol., 2(4):239-249, April 1972. 26 refs.*

The chemical process industry, historically a customer of the electric utility industry, can become a most important partner to the utilities and help to supply this country's ever increasing appetite for electrical power within the framework of a livable environment. The approach to the energy problem that shows the most potential benefits involves the transformation of high-sulfur, polluting fuels to an essentially free, low-heating-value gaseous fuel by the chemical process industry, and use of these fuels in advanced-cycle power systems that operate at new levels of efficiency. The key to this approach is increased thermodynamic efficiency and relatively low owning-plus-operating costs of advanced power systems. Limitations of current power systems, binary cycles, other external combustion closed cycle systems, gas turbine based systems, and combined-cycle systems are discussed, as well as future constraints, fuel desulfurization by gasification, and the introduction of combined gas and steam turbine power systems.

25103 **APTIC NO. 46667**

Schoell, G.

TWO THOUSAND-MW-POWER-PLANT WITHIN THE COOLING TOWER. *(2000-MW-Kraftwerk im Kuehlturm). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 26(39):1, 6, 1972.*

For cooling the waste heat of large power plants with capacities of 1000 MW, 2000 MW, and more, natural draft cooling towers composed of individual stacks are recommended. The cooling tower can be of any desired shape. The cylindrical stacks are arranged close to each other. The space between the stacks is sealed off by elastic curved metal sheets. These new cooling towers operate economically only larger than 150 m high with a diameter of 20 m. The entire cooling tower must have an average diameter of more than 120 m. The cylindrical stacks rest on 30 m high supporting walls with lancet-shaped cross sections. Two cooling towers are shown in a photograph.

the round one comprising 24 individual stacks set up 1 m apart. The rectangular cooling tower has 30 cylindrical stacks and four square towers at the corners housing offices and apartments. The waste heat is discharged high enough into the atmosphere to avoid negative effects in the neighborhood.

25104 **APTIC NO. 46834**

Schoeppel, Roger J.

PROSPECTS FOR HYDROGEN-FUELED VEHICLES. *Chem. Technol., vol. 2:476-480, Aug. 1972. 30 refs. (Presented at the American Chemical Society, Non-Fossil Fuels Symposium, Boston, Mass., 1972.)*

The conversion of vehicles from conventional fuels to hydrogen is forecast to fulfill a more viable long-range solution to the air pollution problem than any heretofore proposed. Techno-economic factors and political circumstances that may influence the future pattern of automotive vehicle development are evaluated. The prospects for development of total energy system that produces hydrogen from an abundant natural resource, water, and replenishes this supply upon combustion in an engine whose emissions are almost pollution-free, appears to be a worthwhile effort to pursue. (Author conclusions modified)

25105 **APTIC NO. 46897**

Shepard, S. H.

OUTLOOK BRIGHT FOR U. S. URANIUM INDUSTRY. *Mining Engineering, 24(10):86-89, Oct. 1972.*

Significant events which have occurred in the nuclear industry during the past year include a surge in nuclear power plant orders, delays in nuclear plant licensing and construction, increased environmental concern, and the new Atomic Energy Commission nuclear fuel policy. These events and, in particular the Atomic Energy Commission stockpile release policy, have motivated a reappraisal of the outlook for the uranium industry. AEC stockpile disposal, uranium demands, uranium supply, and uranium production costs are discussed. Barring any catastrophic nuclear accidents or major environmental reversals, nuclear power has seen its greatest hurdles. The radiation release problem is being solved, and thermal release is finally getting careful attention and is being minimized. Radioactive waste storage is probably the largest unresolved question. Nuclear power has a $10.12/kw cost advantage over a coal-fueled plant and a $7.50/kw advantage over an oil-fueled plant.

25106 **APTIC NO. 46863**

Sibbett, Donald J., Rudolph H. Moyer, and George H. Milly

EMISSION OF MERCURY FROM LATEX PAINTS. *Am. Chem. Soc., Div. Water, Air Waste Chem., Gen. Papers, 12(1):20-26, 1972. 5 refs. (Presented at the American Chemical Society, National Meeting, 163rd, Boston, Mass., April 1972.)*

To determine the levels of total mercury emanating from surfaces after application of a latex paint, the walls of a room measuring 5.36 by 4.37 by 2.47 m were given one coat utilizing standard roller and brush methods. A total of 0.28 g Hg combined as fungicide was involved. Hg concentrations were determined by photometry. During its application, the permissible limits for mercury organic compounds of this type in the air as recommended by the American Conference of Governmental Industrial Hygienists, a time-weighted average of 50 micrograms/cu m, was not exceeded with the paint sample tested. However, under inappropriate conditions, such as poor air circulation and high temperatures, this limit could be exceeded during painting operations despite the low mercury concentration in the liquid paint sample. Indoors, the mercury vapor concentration after application of the paint was approximately a thousand times that of the ambient, out-of-doors atmosphere after 220 hours. On the basis of a ventilation analysis, it appears that mercury containing vapors will remain in the air almost indefinitely. It seems reasonable that a normal human exposed to the specific experimental environment would absorb approximately 36 micrograms of mercury containing compounds in 16 hours.

25107 **APTIC NO. 46447**

Simecek, Jaroslav, Miloslav Musil, and Milos Pulkrabek

MEASUREMENT AND EVALUATION OF GLASS FIBER DUST. *(Messung und Beurteilung des Staubes aus Glasfasern). Text in German. Staub, Reinhaltung Luft, 32(9):357-360, 1972. 1 ref.*

The particle size distribution of dust from glass fiber (insulating material for buildings) was investigated under an illuminated microscope. The results of this method were not comparable with the results of the sedimentation analyses (the sedimentation pipette method and the sedimentometer manufactured by the Leitz firm). The quality of the different types of fiberglass fabrics used for decorative curtains was evaluated with regard to the prevention of air pollution. The pollution was assessed according to the content of glass fibers present in the experimental chamber and according to their concentration and particle size distribution. In the case of finished fabrics, air pollution was about four times lower than when fabrics without finishing were used.

25108 **APTIC NO. 46839**

Simpson, John W.

THE CASE FOR NUCLEAR ENERGY. *IEEE (Inst. Elec. Electron. Engrs.) Spectrum, 9(9):71-73, Sept. 1972. 6 refs.*

Nuclear energy represents an energy source that can be used to fully meet power demands for the next century or two, with technology that is presently at hand. Atomic fission gives us accessibility to almost infinite energy through use of the fast breeder reactor. The fast breeder reactor represents the only renewable source of energy now available, in that this type of reactor is able to produce more fuel than it consumes while generating electric power. For environmental and economic reasons, the percentage of energy forms utilizing the combustion process for stationary power sources will rapidly decline in use in the decades ahead, and electric energy will be substituted. The cost of protecting the environment must also be factored into projections of future costs of electric power. In cases where power plant thermal inputs may cause harm to a particular ecosystem, supplementary cooling apparatus can be used. Possible uses of the waste heat are indicated.

25109 **APTIC NO. 46866**

Skinner, J. H., R. P. Shah, and J. B. Okesson

MODELING, ANALYSIS, AND EVALUATION OF RANKINE CYCLE PROPULSION SYSTEMS. VOLUME II: USERS MANUAL. *General Electric Co., Schenectady, N. Y., Mechanical Engineering Lab., Office of Air Programs Contract EHS 70-111, Rept. S-71-1129-2, APTD-0961, 426p., Feb. 1972.*

NTIS: PB 209278

Computer program listing for models derived for the analysis and evaluation of Rankine cycle engines are presented. Fortran nomenclature, flow diagrams, input and output information, and manual instructions are included. The models include the fluid property models, reciprocating expander model, turbine expander model, feedpump model, vapor generator model, condenser model, generator model, combustor model, transmission model, driver model, parametric design program, and total system model. (Author abstract modified)

25110 **APTIC NO. 46985**

Spencer, John D. and Bill Linville

BUREAU OF MINES ENERGY PROGRAM, 1971. *Bureau of Mines Information Circ., no. 8551, p. 43-44, 1972.*

Coal contains traces of toxic elements, the most volatile of which is mercury. Neutron activation analysis and double gold amalgamation-flameless atomic absorption are the two most reliable methods for determining mercury in coal. Experiments were conducted aimed at determining what happens to mercury in coal during combustion. Sampling, inspection, and analytical services by the Bureau of Mines were continued to help Federal agencies procure coal on specifications and bids. Services provided include coal analyses, technical advice on coal purchases, and help in determining contract awards and implementing the contracts. (Bibliography is Aptic 46987.)

25111 **APTIC NO. 46986**

Spencer, John D. and Bill Linville

BUREAU OF MINES ENERGY PROGRAM, 1971. *Bureau of Mines Information Circ., no. 8551, p. 66-71, 1972.*

An experimental study of the relationship of exhaust composition to fuel composition was continued in an effort to provide improved information from which to judge the overall consequence to the smog problem if fuels are altered markedly. Results both of fleet tests and of detailed laboratory smog tests provided additional evidence that relates smog to specific fuel components. Experimental work was begun to determine if toxic materials result from any of the additives used in fuels. An important part of diesel odor was in the relatively volatile fraction of the exhaust product. Information on the relationship of engine adjustments to effective utilization of the light hydrocarbons, natural gas (methane), and propane in meeting low emission objectives was obtained. Emission characteristics of a hybrid system were determined. Other experimental work confirmed that fuel properties do not affect diesel emissions, and provided information on the manner in which emissions are influenced by adjustment of the engine parameters. (Bibliography is Aptic 46987.)

25112 **APTIC NO. 46891**

Spragins, F. K.

THE NEW LOOK IN THE SYNCRUDE CANADA TAR SANDS PROJECT. *Mining Engineering, 24(10):90-92, Oct. 1972. 3 refs.*

When and if fully developed, Athabasca tar sands could make both Canada and the United States substantially independent of all off-shore supplies of crude oil for many years to come. The main body of Athabasca tar sands, about 250 miles northeast of Edmonton, are centered in an area of something over 12,000 sq mi. The deposit runs as high as 250,000 bbl/acre and the average richness is placed at 100,000 bbl/acre. Interest in Athabasca is reviewed, including the Great Canadian Oil Sands plant which first started to produce oil in September 1967. In Syncrude s new look at tar sand production, it is known that the proposed synthetic crude will be a low sulfur, high quality heavy bottoms free material. Syncrude s tar sand production plan is discussed.

25113 **APTIC NO. 46451**

Strifler, Paul and W. Schmidt

ELECTRIC DRIVE FOR URBAN DELIVERY TRUCKS - MERCEDES-BENZ ELECTRIC TRUCK LE 306. *(Elektroantrieb fuer Stadtverteilerfahrzeuge - Mercedes-Benz Elektro-Transporter LE 306). Text in German. Automobiltech. Z. (Stuttgart), 74(9):360-365, 1972. 6 refs.*

Urban delivery trucks span distances of 20 to 150 km/day. In one leg they cover only 17 to 64 km. The relatively short distances and the intervals of 0.7 to 2.5 hr which can be used for charging the batteries would permit the operation with electric drives supplied by batteries. With rapid battery replacement systems, the battery weight could possibly be reduced to 20% of the total weight. In connection with the development of low-pollution vehicles, an electrically driven delivery truck with a net load of 1 ton was developed. It has a DC shunt-wound electric motor which functions as generator during breaking and supplies power to the battery. The disadvantage of the short distance that can be covered with the lead battery is compensated by the rapid replacement system applied. During breaks and as long as no replacement stations exist, the battery can be loaded via a plug on the truck. The emission-free low-noise electric drive, however, will find broad use for delivery trucks only if the higher costs as compared to diesel operated trucks are accepted as the price for a better environment.

25114 **APTIC NO. 46926**

Sugishima, Wasaburo

ROTARY KILN TYPE INCINERATOR. *(Rotari kirun shiki shokyakuro). Text in Japanese. Kagaku Kojo (Chem. Factory), 16(7):42-47, July, 1972. 4 refs.*

A rotary kiln in the primary combustion chamber of an incinerator is one of the most effective methods for continuous and large-volume incineration of plastic wastes. A controlled combustion system is generally more popular for plastic incineration, in which the primary combustion furnace s temperature and volume of air are controlled so that the thermal cracking of the plastics may take place there. The combustible gas generated in the primary combustion furnace is then led into the secondary combustion furnace where it is burned with a sufficient volume of air for perfect combustion. The rotary kiln incinerator designed by Mitsubishi is discussed, and the test results are given. The rotary kiln used as the primary combustion furnace is a slanting type in which the plastic wastes roll along the internal wall of the kiln and are melted and pyrolyzed by the radiation heat from the secondary combustion furnace. It s a controlled combustion type with no air blown into it. The schematic diagram and main specifications of this pilot plant for incineration of the plastics wastes are all given. Several types of refuses or wastes including plastics, synthetic rubber, sludges, and mixtures of miscellaneous wastes were incinerated to examine the hourly disposal quantity, the calorific value per kg, the intra-furnace temperatures and other factors. Properties of the wastes to be incinerated affect selection of the type of rotary kiln; structure of the recombustion chamber has something to do with the calorific value; and recycling of the low-oxygen combustion gas is effective to control combustion and keep gas generation uniform, consequently preventing generation of smoke.

25115 **APTIC NO. 46583**

Syrota, J.

DATA CONCERNING THE PROBLEM OF ATMOSPHERIC POLLUTION. *(Les donnees du probleme de la pollution atmospherique). Text in French. Ann. Mines (Paris), no. 4/5:3, 7, 9-175, May/June 1972. 9 refs.*

The problem of air pollution in France, with some reference to other countries, is examined in detail. The main sources of air pollution, methods used for its control, and data on the network of monitoring stations and the degree of pollution in France are reviewed. The effects of pollution on human health, plants, and materials and problems encountered in field and laboratory experiments are discussed. The psychological effects of air pollution are also considered. The physical and chemical characteristics of pollutants, diffusion phenomena, and atmospheric interactions are examined. Control methods and abatement techniques, including mechanical equipment, chemical methods, legal and administrative aspects, and control technologies, are discussed. Control methods for industrial emissions, combustion installations, and automotive emissions are examined in detail. The economic aspects of air pollution and air pollution control are considered.

25116 **APTIC NO. 46698**

Szucs, Miklos and Peter Zsiga

THE ROLE OF THE LIQUEFACTION AND OF THE STORAGE OF NATURAL GAS IN LIQUEFIED FORM IN MEETING GAS PEAK DEMANDS. *(A foldgaz* *cseppfolyositas es cseppfolyositott foldgaztarolas szerepe a gazfogyasztasi csucsigenyek kielegiteseben). Text in Hungarian. Energiagazdalkodas, 13(7):289-296, July 1972. 18 refs.*

Technical and economic aspects of the liquefaction and storage of natural gas as a means of peak shaving in Hungary are reviewed. The ever-increasing natural gas consumption, even for heating purposes, entails longer and higher peak periods in the heating season. The increase in the winter peak by 1975 is expected to be 14-16%. Underground storage in gaseous form, increasing the pool of alternative large gas consumers, overdimensioning of supply lines, and storage in liquefied form constitute the basic options for peak shaving. If storaging in gaseous form or production of natural gas within a distance of 250-300 km of the consuming agglomeration is possible storaging in liquefied form is not economical. The use of synthesis gas is another possibility to meet peaks in the consumption. Natural gas liquefaction techniques such as classic and modified cascade and expansion processes are described. Preliminary purification of the natural gas is necessary before liquefaction is done under pressure, and the liquefied gas is storaged under nearly atmospheric pressure. Native rock, dirt, concrete or metal can be used as container walls, and also the use of natural cavities is possible on principle. Steam, hot water, air, electricity, and especially river water are suitable for the gasification of liquefied natural gas. Capital costs of liquefaction as a function of the anticipated seasonal fluctuations in the consumption are calculated.

25117 **APTIC NO. 46922**

Voigtsberger, Paul and Guenter Matzkuhn

STUDY OF THE POLLUTANT EMISSION OF AUTOMOBILE ENGINES. *(Untersuchung der Schadstoffemission von Kraftfahrzeugmotoren). Text in German. Automobiltech. Z. (Stuttgart), 74(10):397-403, 1972.*

Five six-cylinder water-cooled engines with different injection systems (two with Solex carburetors, one with mechanical gasoline injection, one with two Zenith register carburetors, and one with electronically controlled gasoline injection) were subjected to extensive examinations of the pollutant emission during operation. All tests were run with the same fuel. Part of the exhaust gas was branched off and passed through a water cooler and a coarse filter into the membrane pump. The membrane was teflon-coated for limiting the hydrocarbon losses. From there the samples were passed to continuously measuring analyzers and to the ultraviolet and infrared spectrometers. With the analyzers the concentrations of the oxygen, carbon dioxide, carbon monoxide, butane, hexane, nitric oxide, nitrogen dioxide, and total hydrocarbons could be continuously measured. The continously measuring spectrometers permitted the identification of certain cracking products. One of the automobiles was equipped with a man-air-ox system. In none of the cases was the pollutant emission above the limit values, not even in the test without man-air-ox systems. With all automobiles, the Europe cycle was run. In the first automobile 1.33 g HC/100 g fuel were measured with the URAS and 1.45 g HC/100 g fuel with the flame ionization detector. The hexane concentration with the URAS was 340 ppm, with the flame ionization detector 370 ppm. The CO emission was 37 g/100 g fuel. Values of a similar order of magnitude were obtained for the second automobile. The results of the test with the other cars will be reported in a future paper.

25118 **APTIC NO. 46551**

Yamamoto, Keizo and Tadasuke Morita

TREATMENT OF OIL REFINERY WASTE. *(Sekiyu seisei kojo ni okeru haikibutsu shori). Text in Japanese. Sekiyu Gakkai-shi (J. Japan Petroleum Inst., Tokyo), 15(7):591-595, July 1972. 2 refs.*

After many laboratory experiments and on-site tests, a system of treating the American Petroleum Institute separator emulsion and activated sludge created at an oil refinery was developed, and constructed. The system includes the API separation process, two aeration tanks, a precipitation tank, two thickeners, a press dehydrator, two incinerators, a dust eliminator, and an ash bunker. Water is first eliminated in the emulsion tank, where the temperature is kept at 70 C, and after going through a strainer (mesh 20), the liquid is sent to a centrifugal separator where oil, water, and solids are separated from each other. The oil is used as fuel for the incineration of dehydrated cakes, and the excess oil is transported to the slop tank and is mixed with crude oil. Water is returned to the API separator and, after treatment with activated sludge, is discharged into the ocean. The solid material is dehydrated in the press and the cakes containing oil and bacteria are burned in a rotary kiln and later disposed of on the ground. The combustion gas from the incinerator is burned in the secondary incinerator at 800 C or higher, which eliminates the odor. The gas is then sent to a spray tower, a venturi scrubber, and a mist catcher, and finally emitted from the stack.

25119 **APTIC NO. 46808**

Zaborowski, Leon M., John W. Hill, and Milan W. Wehking

POLYMER PYROLYSIS. HYDROGEN CYANIDE FROM THE OPEN BURNING OF ORLON. *Environ. Letters, 3(4):267-270, 1972. 5 refs.*

The generation of hydrogen cyanide from the pyrolysis of orlon (polyvinyl cyanide) was verified in laboratory experiments. The experimental apparatus and procedure, sampling, and analysis are reviewed. Since even as little as 0.1 g of HCN can cause death, this is of great importance for the field of incineration or open burning of wastes that might conceivably consist of these polymers.

25120 **APTIC NO. 46679**

Zvonov, V. A., V. N. Malakhov, V. Z. Ritvin, and V. V. Stolbovskiy

SOME RESULTS OF INVESTIGATIONS OF THE TOXICITY OF MEMZ-968 MODEL ENGINE EXHAUST UNDER IDLING CONDITIONS. *(Nekotoryye rezul taty issledovaniya toksichnosti dvigatelya MeMZ-968 na rezhime kholostogo khoda). Text in Russian. Avtomob. Prom., no. 5:6-8, July 1972. 1 ref.*

Field and test stand experiments were carried out to determine the causes of the considerable spread in the exhaust carbon monoxide concentration values (0.5-10.5%) obtained for MeMZ-968 model carburetted engines at lowest idle speed in previous tests. The concentrations of CO, hydrogen, nitrogen, total hydrocarbons, carbon dioxide, and oxygen in the exhaust of the run-up engines were measured. The CO concentration was determined to be strongly dependent on the state of repair and the thermal regime of the engine at minimum idle speed. The influence of the idle adjustment at maximum idle speed with main dosaging system working was apparent. The principal cause of the considerable spread in the measured CO concentrations was found in uneven fuel distribution among the cylinders with misfirings and dilution of the exhaust gas by the unburned fuel-air mixture as a result. The CO concentration decreased with increasing air-excess coefficient to reach a minimum of about 0.6% at a coefficient of 1.14. The concentration of unburned hydrocarbons fell to 0.9-1.0% with rising air-excess coefficient to rise again at higher coefficients. The increase in the O2 concentration with rising air-excess coefficient was more intense than it could be expected from the stoichiometric relation. The reduction of the CO content at high idling speeds required the joint regulation of the main dosaging and the carburetor idle adjustment systems.

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25121 **APTIC NO. 46644**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF WEST VIRGINIA *APTD-1030, 20p., June 1971.*

NTIS: PB 210012

The major facilities of real property owned by the Federal Government in West Virginia are listed alphabetically by city of location. The agency which operates the facility, General Service Administration inventory number, GSA location code, total floor area of all the buildings, and a size classification code are given. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they do not present any air pollution potential. Addresses of the regional offices of the Environmental Protection Agency and a map of the Federal air pollution control regions are included. (Author introduction modified)

25122 **APTIC NO. 46645**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF HAWAII. *APTD-1015, 14p., May 1971.*

NTIS: PB 209975

The major facilities of real property owned by the Federal government in Hawaii are listed alphabetically by city of location. The agency which operates the facility, General Services Administration inventory number, GSA location code, total floor area of all the buildings, and a size classification code are given. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they do not present any air pollution potential. Addresses of the regional offices of the Environmental Protection Agency and a map of the Federal air pollution control regions are included. (Author introduction modified)

25123 **APTIC NO. 46646**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF MONTANA. *APTD-1052, 19p., June 1971.*

NTIS: PB 209990

The major facilities of real property owned by the Federal government in Montana are listed alphabetically by city of location. The agency which operates the facility, General Service Administration inventory number, GSA location code, total floor area of all the buildings, and a size classification code are given. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they do not present any air pollution potential. Addresses of the regional offices of the Environmental Protection Agency and a map of the Federal regions are included. (Author introduction modified)

25124 **APTIC NO. 46647**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF ALASKA. *APTD-1027, 22p., May 1971.*

NTIS: PB 209965

The major facilities of real property owned by the Federal government in Alaska are listed alphabetically by city of location. The agency which operates the facility, General Service Administration inventory number, GSA location code, total floor area of all the buildings, and a size classification code are given. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they do not present any air pollution potential. Addresses of the regional offices of the Environmental Protection Agency and a map of the Federal regions are included. (Author introduction modified)

25125 **APTIC NO. 46648**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF MASSACHUSETTS. *APTD-1057, 27p., June 1971.*

NTIS: PB 209985

The major facilities of real property owned by the Federal government in Massachusetts are listed alphabetically by city of location. The agency which operates the facility, General Services Administration inventory number, GSA location code, total floor area of all the buildings, and a size classification code are given. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they do not present any air pollution potential. A map of Federal air pollution control regions, and addresses of regional air pollution control offices are included. (Author introduction modified)

25126 **APTIC NO. 46649**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF COLORADO. *APTD-1022, 21p., May 1971.*

NTIS: PB 209969

The major facilities of real property owned by the Federal government in Colorado are listed alphabetically by city of location. The agency which operates the facility, General Services Administration inventory number, GSA location code, total floor area of all the buildings, and a size classification code are given. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they do not present any air pollution potential. A map of Federal air pollution control regions, and the addresses of regional air pollution control offices are included. (Author introduction modified)

25127 **APTIC NO. 46650**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF INDIANA. *APTD-1064, 23p., May 1971.*

NTIS: PB 209978

The major facilities of real property owned by the Federal government in Indiana are listed alphabetically by city of location. The agency which operates the facility, General Services Administration inventory number, GSA location code, total floor area of all the buildings, and a size classification code are given. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they do not present any air pollution potential. Addresses for the regional offices of the Environmental Protection Agency and a map of the Federal air pollution control regions are included. (Author introduction modified)

25128 **APTIC NO. 46651**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF WASHINGTON. *APTD-1031, 28p., June 1971.*

NTIS: PB 210011

The major facilities of real property owned by the Federal government in Washington are listed alphabetically by city of location. The agency which operates the facility, General Services Administration inventory number, GSA location code, total floor area of all the buildings, and a size classification code are given. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they do not present any air pollution potential. Addresses for the regional offices of the Environmental Protection Agency and a map of the Federal air pollution control arc included. (Author introduction modified)

25129 **APTIC NO. 46653**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF WISCONSIN. *APTD-1029, 23p., June 1971.*

NTIS: PB 210013

The major facilities of real property owned by the Federal government in Wisconsin are listed alphabetically by city of location. The agency which operates the facility, General Services Administration inventory number, GSA location code, total floor area of all the buildings, and a size classification code are given. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they do not present any air pollution potential. Addresses for the regional offices of the Environmental Protection Agency and a map of the Federal air pollution control regions are included. (Author introduction modified)

25130 **APTIC NO. 46654**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF GEORGIA. *APTD-1018, 24p., May 1971.*

NTIS: PB 209974

The major facilities of real property owned by the Federal government in Georgia are listed alphabetically by city of location. The agency which operates the facility, General Services Administration inventory number, GSA location code, total floor area of all the buildings, and a size classification code are given. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they do not present any air pollution potential. Addresses of the regional offices of the Environmental Protection Agency and a map of the Federal air pollution control regions are included. (Author introduction modified)

25131 **APTIC NO. 46655**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF MISSOURI. *APTD-1053, 23p., June 1971.*

NTIS: PB 209989

The major facilities of real property owned by the Federal government in Missouri are listed alphabetically by city of location. The agency which operates the facility, General Services Administration inventory number, GSA location code, total floor area of all the buildings, and a size classification code are given. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they do not present any air pollution potential. Addresses of the regional offices of the Environmental Protection Agency and a map of the Federal air pollution control regions are included. (Author introduction modified)

25132 **APTIC NO. 46656**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF DELAWARE. *APTD-1020, 14p., May 1971.*

NTIS: PB 209971

The major facilities of real property owned by the Federal government in Delaware are listed alphabetically by city of location. The agency which operates the facility, General Services Administration inventory number, GSA location code, total floor area of all the buildings, and a size classification code are given. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they do not present any air pollution potential. Addresses of the regional offices of the Environmental Protection Agency and a map of the Federal air pollution control regions are included. (Author introduction modified)

25133 **APTIC NO. 46657**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF IOWA. *APTD-1063, 21p., May 1971.*

NTIS: PB 209979

The major facilities of real property owned by the Federal government in Iowa are listed alphabetically by city of location. The agency which operates the facility, General Services Administration inventory number, GSA location code, total floor area of all the buildings, and a size classification code are given. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they do not present any air pollution potential. Addresses for the regional offices of the Environmental Protection Agency and a map of the Federal air pollution control regions are included. (Author introduction modified)

25134 **APTIC NO. 46658**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF ALABAMA. *APTD-1026, 21p., May 1971.*

NTIS: PB 209964

The major facilities of real property owned by the Federal government in Alabama are listed alphabetically by city of location. The agency which operates the facility, General Services Administration inventory number, GSA location code, total floor area of all the buildings, and a size classification code are given. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they do not present any air pollution potential. Addresses for the regional offices of the Environmental Protection Agency and a map of the Federal air pollution control regions are included. (Author introduction modified)

25135 **APTIC NO. 46659**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF MICHIGAN. *APTD-1056, 27p., June 1971.*

NTIS: PB 209986

The major facilities of real property owned by the Federal government in Michigan are listed alphabetically by city of location. The agency which operates the facility, General Services Administration inventory number, GSA location code, total floor area of all the buildings, and a size classification code are given. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they do not present any air pollution potential. Addresses for the regional offices of the Environmental Protection Agency and a map of the Federal air pollution control regions are included. (Author introduction modified)

25136 **APTIC NO. 46660**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF KENTUCKY. *APTD-1061, 21p., June 1971.*

NTIS: PB 209981

The major facilities of real property owned by the Federal government in Kentucky are listed alphabetically by city of location. The agency which operates the facility, General Services Administration inventory number, GSA location code, total floor area of all the buildings, and a size classification code are given. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they do not present any air pollution potential. Addresses of the regional offices of the Environmental Protection Agency and a map of the Federal air pollution control regions are included. (Author introduction modified)

25137 **APTIC NO. 46661**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF SOUTH DAKOTA. *APTD-1037, 17p., June 1971.*

NTIS: PB 210005

The major facilities of real property owned by the Federal government in South Dakota are listed alphabetically by city of location. The agency which operates the facility, General Services Administration inventory number, GSA location code, total floor area of all the buildings, and a size classification code are given. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they do not present any air pollution potential. Addresses for the regional offices of the Environmental Protection Agency and a map of the Federal air pollution control regions are included. (Author introduction modified)

25138 **APTIC NO. 46662**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF NEBRASKA. *APTD-1051, 18p., June 1971.*

NTIS: PB 209991

The major facilities of real property owned by the Federal government in Nebraska are listed alphabetically by city of location. The agency which operates the facility, General Services Administration inventory number, GSA location code, the total floor area of all the buildings, and a size classification code are given. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they do not present any air pollution potential. Addresses for the regional offices of the Environmental Protection Agency and a map of the Federal air pollution control regions are included. (Author introduction modified)

25139 **APTIC NO. 46663**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF OHIO. *APTD-1043, 30p., June 1971.*

NTIS: PB 209999

The major facilities of real property owned by the Federal government in Ohio are listed alphabetically by city of location. The agency which operates the facility General Services Administration inventory number, GSA location code, total floor area of all the buildings, and a size classification code are given. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they do not present any air pollution potential. Addresses for the regional offices of the Environmental Protection Agency and a map of the Federal air pollution control regions are included. (Author introduction modified)

25140 **APTIC NO. 46547**

Blackard, Wayne A.

AIR POLLUTION REPORT. FEDERAL FACILITIES. METROPOLITAN DAYTON INTRASTATE AIR QUALITY CONTROL REGION. *Air Pollution Control Office, Rockville, Md., Federal Facilities Branch, APTD-1001, 22p., Jan. 1971. 7 refs.*

NTIS: PB 209673

The status of Federally owned facilities within the Metropolitan Dayton Air Quality Control Region is reported with regard to the implementation of the objectives of the Clean Air Act, as amended. Fuel (oil, gas, and coal) usage, refuse disposal practices (incineration and open burning), air pollution emissions, and proposed abatement measures are discussed for the 52 Federal installations within the Region. The facilities annually emit a total of 3000 tons of sulfur oxides, 1500 tons of nitrogen oxides, 1400 tons of particulates, 350 tons of carbon monoxide, and 210 tons of hydrocarbons. These emissions contribute less than 2% of the total particulates, CO, and SOx from all stationary sources within the area. Emissions from transportation sources were not included. Point sources and installations having coal-fired boilers in violation of the Federal particulate emission limitations are listed.

25141 **APTIC NO. 46643**

Cook, Charles W.

BUDGETING FOR WEB? DON'T OVERLOOK CLEAN AIR COSTS. *Print. Impress., 13(11):24-25, 90, 98, April 1971.*

Air pollution control authorities at all levels are beginning to insist that web offset printers take definite action to reduce or eliminate dryer emissions to the atmosphere. In the case of existing plants, municipal authorities will be citing local nuisance laws that go into effect automatically with the first complaint (usually about odor) registered by any citizen in the community. In the case of new web offset plants, it is unlikely that local authorities will issue licenses or permits without proof that dryer equipment does not contribute to air pollution. It should be mandatory for all printers to install the proper type of anti-pollution equipment during or over the same extended period of time. In this manner, competitive costs would be increased in a more balanced fashion and discrimination in application of the law avoided.

25142 **APTIC NO. 46639**

Dennison, William

AIR POLLUTION REPORT. FEDERAL FACILITIES. METROPOLITAN LOUISVILLE INTERSTATE AIR QUALITY CONTROL REGION. *Office of Air Programs, Rockville, Md., Federal Sources Branch, APTD-1002, 21p., April 1971. 7 refs.*

NTIS: PB 209705

The Metropolitan Louisville Interstate Air Quality Control Region was designated on Dec. 6, 1969, to include Clark and Floyd Counties in Indiana plus Jefferson County in Kentucky. The 43 Federal facilities in the region are listed along with data concerning both fuel-burning and refuse disposal practices. Fuel use is summarized by county. The total fuel use for Federal facilities in the region is 215 thousand tons of coal; 51,930 gallons residual oil; 3,538,369 gallons distillate oil; and 448 million cu ft natural gas. The facilities emit a total of 16,300 tons of sulfur oxides, 2600 tons of nitrogen oxides, 75 tons of carbon monoxide, 18,600 tons of particulates, and 29 tons of hydrocarbons per year. Specific Federal facilities which emit more than 100 tons/yr of any one type of pollutant are listed, in addition to the approximate rate at which they are polluting. Coal-fired boilers which are in violation of regulations 42 CFR 76.4 are listed. The current status of the Federal installations within the region with respect to the implementation of their abatement plans is shown.

25143 **APTIC NO. 46860**

Dukowicz, J., W. Fraize, E. Keitz, S. Poh, and J. Stone

ADVANCED AUTOMOTIVE POWER SYSTEM STRUCTURED VALUE ANALYSIS MODEL. *Mitre Corp., Washington Operations, Div. of Advanced Automotive Power Systems Development Contract F19628-71-C-0002, Proj. 8860, Rept. MTR-6085, APTD-0966, 280p., Oct. 1971. 64 refs.*

NTIS: PB 209286

A structured value analysis model was developed for use in evaluating advanced automotive low-emission power systems and as a basis for decisions relating to further developments of candidate power systems. The preliminary list of parameters used to describe the systems includes emissions, operating performance, acceptability, operating environment, safety, personnel and facilities, propulsion system technical characteristics, reliability, and maintenance. Emission control goals are reviewed for carbon monoxide, hydrocarbons, nitrogen oxides, sulfur oxides, particulates, smokes, and odors. The cost evaluation considers four major categories: research, development, test, and engineering; cost to the consumer; economic reallocation; and cost to governments. Complete analytical data, charts, graphs, and result of model analysis are presented.

25144 **APTIC NO. 46634**

Glinkov, M. A. and N. M. Morekhina

THE GASEOUS PHASE ABOVE THE MELT AS A FACTOR INFLUENCING THE FORMATION OF BROWN SMOKE IN STEEL-MAKING FURNACES. *(Gazovaya faza nad rasplavom kak faktor obrazoyaniya burogo dyma stalesplavil nykh pechey). Text in Russian. Izv. Vysshikh. Uchebn. Zavedenii Chernaya Met., no. 3:168-170, 1971. 3 refs.*

The formation and composition of brown smoke as a function of the composition of the gaseous phase occurring above the steel melt during oxygen blast was studied in laboratory experiments by varying the oxygen-to-nitrogen ratio and the amount of the oxygen. Nitrogen concentrations above the melt with steady oxygen blast intensity influenced the dust content in the brown smoke. Decreased oxygen concentrations above the melt resulted in sharp decrease in the dust emission. The cooling of the melting zone and hence the reduced evaporation of the melt were found to be the major cause of the reduced brown smoke emission during oxygen blast. The final composition of the finely dispersed dust in the brown smoke is determined by the gaseous phase above the melt where a definite oxygen concentration produces ferric oxide which is ultimately responsible for the brown color of the smoke. The findings suggest the possibility to influence the rate of emission of brown smoke and the properties of its dust particles by controlling the composition of the gaseous phase above the melt.

25145 **APTIC NO. 46544**

Gross, G. P.

SECOND ANNUAL REPORT ON GASOLINE COMPOSITION AND VEHICLE EXHAUST GAS POLYNUCLEAR AROMATIC CONTENT. *Esso Research and Engineering Co., Linden, N. J., Products Research Div., Coordinating Research Council CRC-APRAC Proj. CAPE-6-68, Air Pollution Control Office Contract CPA-70-104, APTD-1296, 109p., April 15, 1971. 17 refs.*

NTIS: PB 209955

Fuel composition, engine deposits, and vehicle emission control systems were studied as variables affecting the exhaust emission of phenols and polynuclear aromatic hydrocarbons (PNA) measured as benzo(a)pyrene (BaP) and benz(a)anthracene (BaA). The exhaust from uncontrolled (1966) and engine-modified (1968 and 1970) vehicles in seven-mode cyclic tests with cold starts was collected and analyzed for PNA and phenols. Emission rates, per gallon of fuel, were 74-776 mg phenol, 3-165 micrograms BaP, and 13-276 micrograms BaA. Standard calculated emission results for carbon monoxide, hydrocarbons, and nitric oxide were obtained concurrently. Fuel composition variables had direct and indirect effects on engine deposits. Fuel-composition variables included aromatics content at 11-12%, 28%, and 46%; fuel PNA content (as BaP, 0 and 3 ppm); fuel lead (0, 0.5, and 3 g/gal); and the content of a high-boiling naphtha (0 and 16% at 12% aromatics, 0 and 2% at 46% aromatics). Engine deposits were formed with commercial gasoline which provided a high lead level with phosphorus and, using a different base fuel and in only two vehicles, low-lead and no-lead levels without phosphorus. Phenol emissions correlated linearly with fuel aromatics. At typical aromatics levels, phenols from the 1970 vehicle were down 30% from the nearly equal 1966 and 1968 vehicles. Engine deposit type had no effect on phenol emission. The PNA emissions from the 1968 and 1970 vehicles were an average of only 30% of the PNA from the 1966 uncontrolled vehicle. In the 1966 and 1968 vehicles, increasing fuel aromatics from 11% to 46% caused PNA emissions to increase by 134%. The presence of antiknock lead in fuel had variable effects on PNA emissions. In 1966 and 1968 vehicles, increases in aromatics caused increases in PNA emission; changes in fuel-derived engine deposits also affected PNA emission by a factor of more than two. High-aromatic fuels produced PNA emissions which were not higher than PNA emissions from low-aromatic fuels under different, higher-emission, deposit conditions. (Author summary modified)

25146 **APTIC NO. 46760**

Kohler, Bertil

DEVELOPMENT TRENDS IN THE DISTRICT HEATING FIELD. *Kem. Tidskr., no. 7-8:38-42, 1971. Translated from Swedish. 13p.*

Several advantages to district heating include less air pollution and economic power generation since heat production can be advantageously combined with electric power production. Development of district heating in Sweden is discussed, although the Soviet Union and Denmark are in the lead with regard to district heating. An improvement of a population center s air conservation is one of the strongest arguments for expanding district heating. Heat delivery from large nuclear power plants is also considered.

25147 **APTIC NO. 46542**

Orr, Franklin M., Jr.

AIR POLLUTION REPORT. FEDERAL FACILITIES. METROPOLITAN SAN ANTONIO INTRASTATE AIR QUALITY CONTROL REGION. *Air Pollution Control Office, Rockville, Md., Federal Facilities Branch, APTD-0996, 24p., May 1971. 7 refs.*

NTIS: PB 209702

The status of Federally owned facilities within the Metropolitan San Antonio Air Quality Control Region is presented with regard to the implementation of the objectives prescribed by the Clean Air Act, as amended. Fuel (coal, oil, gas) usage, refuse disposal practices (incineration and open burning), air pollution, and proposed abatement measures are reported for the 63 Federal installations within the Region. The facilities annually emit a total of 2000 tons of hydrocarbons, 260 tons of nitrogen oxides, 55 tons of particulates, 140 tons of carbon monoxide, and 10 tons of sulfur oxides. Federal facilities contribute approximately 1% of the particulates, 2% of the CO, and 14% of the SOx emitted by all stationary sources in the Region. Aircraft and other transportation sources are not included, although they are significant.

25148 **APTIC NO. 46543**

Orr, Franklin M., Jr.

AIR POLLUTION REPORT. FEDERAL FACILITIES. METROPOLITAN HOUSTON- GALVESTON INTRASTATE AIR QUALITY CONTROL REGION. *Air Pollution Control Office, Rockville, Md., Federal Facilities Branch, APTD-0998, 29p., July 1971. 7 refs.*

NTIS: PB 209704

The status of Federally owned facilities within the Metropolitan Houston-Galveston Air Quality Control Region is presented with regard to the implementation of the objectives of the Clean Air Act, as amended. Fuel (gas, oil, and coal) usage, refuse disposal practices (incineration and open burning) air pollution, and proposed abatement measures are reported for the 87 Federal installations within the Region. The facilities within the Region annually emit a total of 443 tons of nitrogen oxides, 34 tons of particulates, 27 tons of carbon monoxide, 11 tons of hydrocarbons, and 4 tons of sulfur oxides. Federal facilities contribute substantially less than 0.1% of the particulates, CO, and SOx emitted by all stationary sources in the region. Aircraft and other transportation sources are not included in the report, although they are significant.

25149 **APTIC NO. 46511**

Schlinger, W. G. and W. L. Slater

PARTIAL OXIDATION - A MINIMUM POLLUTION ROUTE FOR HYDROGEN MANUFACTURE. *Preprint, American Chemical Society, Washington, D. C., p. 1-8, 1971. 3 refs. (Presented at the American Chemical Society, National Meeting, 161st, Los Angeles, Calif., March 28 - April 2, 1971, Paper 1576.)*

The manufacture of hydrogen from high sulfur residual oil for the desulfurization of fuel oil is discussed. The synthesis gas generation process is described. A cobalt and molybdenum catalyst is suggested for use in the shift converter. Water quench chambers and scrubbers are used in soot recovery and the Rectisol process is suggested for gas purification. Cost feasibility and control regulations are considered.

25150 **APTIC NO. 46640**

Wong, S., J. D. Duncan, D. W. Graumann, J. C. Gibson, and J. J. Killackey

COMPACT CONDENSER FOR RANKINE CYCLE ENGINE. (FINAL REPORT). *AiRearch Manufacturing Co., Los Angeles, Calif., Office of Air Programs Contract EHS 70-123, 94p., Aug. 1971.*

NTIS: PB 208237

A critical problem for a Rankine cycle power system is the large size of the condenser when its design is based on the heat transfer technology presently used in the automotive industries. The frontal area, volume, and fan horsepower requirements of condensers have been excessively large and have been factors in limiting the applicability of Rankine cycle power systems to automobiles. Instead of increasing the physical size and/or fan power to obtain the required heat rejection capacity, the use of more efficient heat transfer designs to obtain greater capacity in units of the same size was investigated. The new perforated fin developed as part of this program has resulted in a substantial reduction in condenser volume. (Author introduction modified)

CONTROL METHODS

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25151 **APTIC NO. 46407**

REDUCE NITROGEN-OXIDES EMISSIONS. *Power, 116(9):83-85, Sept. 1972.*

Because the Environmental Protection Agency test method for nitrogen oxides in boilers produced erroneous results, new tests must be run and the date for utilities to curtail NOx discharges has been pushed back. Combustion operating parameters of load, excess air, staged combustion, flue gas recirculation, and air-preheat temperature can affect NOx concentrations. Low excess air and staged firing can reduce NOx emissions by as much as 80% at full load, depending on individual boiler characteristics. Different types of boilers firing the same fuel can be compared by weighing NOx production against power produced per firing wall. For gas-fired boilers, about 80% of the variation in NOx emissions is related to the variation in gross load per furnace wall. Correlation coefficients for the relationship between emissions and gross load per furnace wall are not nearly as good for oil-fired boilers. Low excess air firing, staged firing, and flue gas recirculation reduce oil-fired NOx emissions. In coal-fired boilers, uncontrolled NOx emissions correlated well with load per furnace firing wall. Staging and low excess air reduced NOx; however, slagging and other conditions during coal-firing are drawbacks. Low excess air can also reduce NOx during oil firing; however, formation of smoke or haze can be a major limitation. Detailed experience in limiting NOx with gas and oil-fired boilers is described. Different combustion modifications have varied effects on operating costs.

25152 **APTIC NO. 46410**

ABATEMENT OF ODOROUS EMISSIONS BY OXIDATIVE PROCESSES. *(Oxydationsverfahren zur Verminderung von geruchsintensiven Emissionen). Text in German. Umwelt (Duesseldorf), no. 4:48-50, Aug.-Sept. 1972. 7 refs.*

Oxidative thermal and catalytic processes for the abatement of odorous emissions are described. The thermal afterburning of odorous waste gases represents the simplest and most reliable method of controlling odorous emissions. The waste gases to be treated are preheated in a heat exchanger, and oxidized in a combustion chamber at a temperature range of 600-950 C. The heat of reaction of the gas mixture is used as a parameter for the control of both the preheat temperature and the auxiliary fuel dosaging. The waste gases are led across a waste-heat boiler and released with a minimum temperature of 150 C. The catalytic oxidation of odorous waste gases takes place in a temperature range of 300-350 C, and the waste heat is utilized for steam generation or for preheating the waste gas to be treated. The waste gas is released at a minimum temperature of 150 C. Support catalysts with platinum or palladium as the active material on heat-resistent chromium-nickel steel are used commonly for such purposes, but also bulk catalysts (platinum or palladium on silica, aluminum oxide, or natural or synthetic silicates with diameters of 4-40 mm and in lengths of 4-8 mm) are used. The latter have large active surfaces and high pressure drop. Honeycomb catalysts, prepared in the form of rods with a lateral length of 25 mm and lengths of 100-400 mm, cause relatively low pressure loss but are fairly expensive. The application of catalytic odor destruction is limited by the presence in the waste gases of certain catalyst poisons. It is not possible to regenerate catalysts deactivated by inorganic contaminants.

25153 **APTIC NO. 46670**

SYNTHETICS MAKE HEADWAY IN THE AUTOMOBILE INDUSTRY. *(Vormarsch der Kunststoffe in der Automobilindustrie). Text in German. Technica, 21(16):1392-1413, 1972.*

Synthetics are used in many ways in car manufacture. In 1960 in an American car about 9 kg of synthetic material were used; by 1970 that quantity had risen to 45 kg per car. Among the many examples given for the use of synthetics in cars, one discusses how synthetics, particularly 6.6-polyamide, contributes a good deal to the control of air pollution. To avoid the losses of gaseous and liquid fuels between the gasoline tank and the supply pipe, a system was developed by which the fuels are passed into a container with charcoal which adsorbs the gasoline vapors. During engine operation, air is drawn from below through the charcoal, the adsorbed gasoline is evaporated, passed to the carburetor, and burned in the engine. The gasoline tank has a sealed inlet which prevents losses of fluid or gases. A heat-stabilized 6.6-polyamide is used as material for the tank. It has the required strength, heat, gasoline resistance, and long lifetime. (p. 1396-98 directly concern air pollution.)

25154 **APTIC NO. 46743**

Steag A. G., Essen (West Germany)

BISCHOFF METHOD DEVELOPMENT PROJECT. (28TH INTERIM REPORT). *(Entwicklungsvorhaben Bischoff-Verfahren). June 16, 1972. Translated from German. 8p.*

The water circulation system, breakdowns, scrubber fouling, ground water analyses, and other operating considerations are outlined for a project to achieve continuous operation of a Bischoff desulfurization installation for 6 weeks. Desulfurization was 70-73% for a stack gas flow of 90,000 cu m/hr and a mean lime dosage rate of 1.15 on a stoichiometric basis, between 73-80% for a flow of 100,000 cu m/hr, and 76-90% for 110,000 cu m/hr.

25155 **APTIC NO. 47027**

Bureau of Mines, Washington, D. C.

CONTROL OF SULFUR OXIDE EMISSIONS IN COPPER, LEAD, AND ZINC SMELTING. *Bureau of Mines Information Circ., no. 8527:1-62, 1972 (?). 6 refs.*

The problems involved in achieving various degrees of control over smelter sulfur oxide emissions are evaluated, as well as the technology available to accomplish the task of assuring clean air. The estimated cost of compliance is reviewed for the copper, zinc, and lead industries, but principal attention is given to the copper situation. Air pollution regulations and smelting practices are considered. Currently, there are three methods in use for reducing the sulfur dioxide concentration in the atmosphere surrounding a smelter: the tall stack; the tall stack coupled with a contact sulfuric acid plant; and closed loop control. The conversion of sulfur dioxide to sulfur trioxide for acid production is discussed, as well as the separation and concentration of sulfur dioxide, reaction of sulfur dioxide to yield solid sulfur compounds, and reduction of sulfur dioxide to elemental sulfur.

25156 **APTIC NO. 46843**

Aalund, Leo

HYDRODESULFURIZATION TECHNOLOGY TAKES ON THE SULFUR CHALLENGE. *Oil Gas J., 70(37):79-90, 92-95, 100, 102-104, Sept. 11, 1972. 23 refs.*

To slake surging demand for low sulfur residual oil, the oil industry is using and developing hydrodesulfurization technology. Up-to-date information is presented on all known routes to low sulfur resid except for two processes—that of British Petroleum and of the Shell Group which will get its first commercial tryout in Sweden next year. Chevron s VGO, RDS, and VRDS Isomax processes are described, in addition to the H-Oil process developed jointly by Cities Service Research and Development Company and Hydrocarbon Research Inc. Esso Research and Engineering Company has processes for direct and indirect desulfurization of heavy oils, called Residfining and Go-Fining, as well as desulfurization schemes that include the Flexicoking process. Gulf Research and Development Company, Institute Francais du Petrole, Standard Oil Company, and Universal Oil Products Company also have desulfurization schemes which are described. Catalysts, costs, applications, process descriptions, reactions, operations, feeds, and process requirements are considered.

25157 **APTIC NO. 46576**

Alekseyev, A. V., Ye. I. Mikhaylov, and N. V. Sokolov

INVESTIGATIONS REGARDING THE IMPROVEMENT OF THE OPERATION OF AIR CLEANING APPLIANCES FOR STATIONARY GAS TURBINE UNITS. *(Issledovaniya po uluchsheniyu raboty vozdukhoochistitelnykh ustroystv statsionarnykh GTU). Text in Russian. Teploenergetika, no. 7:26-29, 1972. 5 refs.*

Dust filters used presently for gas turbine units are reviewed, and louver type inertial dust separators are described. Louvers, cassette, and self-cleaning oil filters, when used alone for gas turbine units, are not satisfactory regarding reliability and efficiency, especially in areas with high dust concentrations. A new type air collector chamber accommodating a louver inertial dust separator with vertical conical louver elements and air intake at the top can be used effectively for medium to coarse fractions either alone or as a preliminary stage for a fine dust separator unit representing a self-cleaning oil filter. The efficiency of the inertial dust separator is above 90%. Diagrams showing the hydraulic resistance as a function of the air flow rate, and the fractional efficiency as a function of the inlet flow rate, are presented.

25158 **APTIC NO. 47011**

Angst, W.

A NEW CENTRAL ELECTRIC STORAGE HEATING SYSTEM. *(Eine neue Elektro-Blockspeicherheizung). Text in German. Elektrizitaetsverwertung, 47(2):54-56, Feb. 1972.*

A new central electric storage heating system with optional fully automatic and manual charge control is described. Such heating systems, available for capacities of 10,000-240,000 kcal/h, are composed of two or more storage tanks incorporated in a heat-insulated casing. The water stored in the water tanks is heated up to 108 C under an overpressure of 0.6 to prevent boiling during the nighttime to take advantage of reduced-rate electricity in this period, and additional heating is done over 2-3 hours during daytime as required. The storage system is heated up to the required capacity by the end of the low-rate electricity supply period. The storage heating system is completed with an independent electrical hot water boiler accommodated in the same or a separate housing.

25159 **APTIC NO. 46590**

Aoyama, Mitsugu

AIR CLEANING EQUIPMENT. *(Kuki seijo sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-37872. 5p., Sept. 25, 1972. (Appl. Nov. 27, 1970, 1 claim).*

The equipment described is designed to give the dust-containing air a shock and, by causing a vibration, to catch pollutants on metal screens. The structure is made of a polygonal outer cylinder and another polygonal but different-shaped inner rotating body. When rotating around the central axis, the corners of the rotating body approach certain points of the outer polygonal frame. The polluted air passes to the inside of the rotating cylinder, collides with buffers (partitions), and passes out from the metal mesh screen into the space between the rotating cylinder and the polygonal cylinder. The air goes through the metal mesh several times before being discharged from the exhaust. The screen can be washed with water or a chemical solution suitable for the toxic pollutant that is caught on the screen.

25160 **APTIC NO. 46388**

Barth, Hans-Georg

ROOM HEATING AND ENVIRONMENT. *(Raumheizung und Umwelt) Text in German. Tech. Umweltmag., no. 4:26-28, Aug. 1972.*

In 1960 78% of all homes were heated with coal. By 1970 this had dropped to 25%, and by 1980 it will go down to 2%. Estimates concerning the contribution of private households to air pollution range from 6 to 25%, the exact extent is not known. Gas, electricity, remote heat, and light fuel oil are used for home heating. The combustion of gas produces the least emissions. The amount of sulfur dioxide emitted is negligible, that of nitric oxide is about as high as that produced by light fuel oil. It is considerably lower than with coke or electric heating. If soot and unburned hydrocarbons are emitted with gas heating, the boiler is not being maintained properly. But the natural gas supply is limited. Despite of this, its percentage among home heating systems will rise from 4% in 1970 to 13% in 1980. Electric heating produces many more emissions, not in the individual homes but in the power plant. Natural gas and oil heating operate with an efficiency of 75%, coal heating with 65%, and electric heating with 30%. The number of fuel oil heating systems is rapidly increasing (63% in 1970). They have contributed a lot to the slow-down of the rising SO2 emissions.

25161 **APTIC NO. 46566**

Batel, Wilhelm

STATE AND TREND OF DEVELOPMENT OF CENTRIFUGAL DUST SEPARATORS. *(Entwicklungsstand und -tendenzen bei Fliehkraftentstaubern) Text in German. Staub, Reinhaltung Luft, 32(9):349-353, 1972. 26 refs.*

After a review of the various types of centrifugal dust separators, e.g., with tangential entrance or axial one, parallelly connected ones to form cyclone groups, or single units, and a review of the calculation and design of cyclones, the trends of cyclone development are discussed. Since the displacement phenomena and the turbulent diffusion are the decisive factors for the dust collection efficiency, all efforts are directed to increasing the displacement velocity and to reducing the effects of turbulence and of secondary flows. The displacement velocity can be increased by increasing the entrance speed and by reducing the diameter of the pipe. The turbulence can be reduced by adequate design of the constructional elements of the cyclone. A large distance of the separating zones to the clean-gas-side is of benefit in this connection. The backflow can be reduced by particle agglomeration.

25162 **APTIC NO. 46935**

Baum, B. and C. H. Parker

REMOVAL OF PLASTIC WASTE IN THE USA. *(Beseitigung von Kunststoffabfaellen in den USA). Text in German. Gummi, Asbest, Kunstst., 25(10):948-952, 1972. 13 refs.*

When burning plastic waste, a very important problem is the corrosion in incineration plants. Corrosion effects are either caused by varying temperatures in the combustion chamber, by the formation of hydrochloric acid or sulfuric acid, or by aggresive vapors at low temperatures. Corrosion can be avoided by burning refuse of a homogeneous composition, by combusting the refuse with a surplus of oxygen, and by choosing a residue time which guarantees a complet incineration of the refuse. For the time being there are no limits in the U. S concerning the hydrochloric acid content in the air. In Europe a hydrochloric acid concentration of 400 to 500 ppm is considered normal. However, it is expected that at least in 1980 the hydrochloric acid content of the air in the U. S. will have risen so much that special measures will have to be undertaken to clean the flue gas of the incineration plants. A most effective process for this cleaning is the wet washing of the gases.

25163 **APTIC NO. 46842**

Beardsley, Charles W.

A SLOW START IN A COLD MARKET. *IEEE (Inst. Elec. Electron. Engrs.) Spectrum, 9(9):22-3', Sept. 1972.*

Examples of the devices, controls, and systems that will find their way into the American car between now and 1975 are presented. Costs for power transistors for pollution controls are estimated to jump to 33.9 million dollars in 1975 from 3.4 million dollars in 1971. Reasons for the uneasy relationship between the automakers and the electronics companies are discussed. A good deal of the electronics that will be appearing between now and 1982 has been legislated into existence. Emission control and safety legislation has created a favorable environment for such systems as antiskid, electronic fuel injection and ignition, passive restraints, and radar collision-avoidance systems. Maintenance of electronic controls for automobiles is also considered.

25164 **APTIC NO. 46389**

Becker, Helmut

WET DUST COLLECTORS FOR SHAFT DRILLING MACHINES IN MINES. *(Nassentstauber fuer Streckenvortriebsmaschinen) Text in German. Glueckauf (Essen), 108(19):868-871, Sept. 14, 1972. (Presented at the International Pneumoconiosis Conference, 4th, Bucharest, Romania, Oct. 2, 1971.)*

Dust collectors in mines should be portable and small, be able to collect fine aerosols with high efficiency, have simple maintenance, and be suitable for operation with any available power. Since no dust collectors were available which fulfilled these demands, various dust collectors for throughputs of up to 500 cu m/min were tested in the laboratory with shale dust for further development. The agglomerator, kinpactor, wet filter, rotovent, and multiklon yielded suitable results. All these collectors operate by uniting the dust with water droplets which are then separated from the air flow. The contact between dust and water is achieved by impaction or by centrifugal force at relative speeds between 50 and 120 m/sec. For a good contact between the two phases, a certain quantity of water must be injected to provide a sufficient number of droplets. With wet collectors a close relationship exists between collection efficiency and a high energy consumption. The examined collectors removed all grains of more than 3 micron diameter with 100% efficiency.

25165 **APTIC NO. 46710**

Bender, Rene J.

EXPANDING ROLE FOR ACTIVATED CARBON. *Power, 116(9):56-57, Sept. 1972.*

Activated carbon is pulverulent or granular carbon or charcoal of various origins in which the natural pores have been multiplied, enlarged, and evacuated under heat and vacuum to increase substantially the total area of contact with a passing fluid. When used as a filter, activated carbon behaves very much like a molecular sieve, trapping selected molecules within its pores while letting the remaining fluid pass through.

The key characteristics of activated carbon are cited. Its use has been stimulated by the movement for the protection of the environment, and the development of nuclear reactors. Treatment of waste water, removal of effluent from sewage sludge, and adsorption of radioactive elements are indicated. Activated carbon is also being used increasingly to purify the air circulated through an industrial or home air conditioning installation.

25166 **APTIC NO. 46846**

Bergmann, Lutz

EXPERIENCES IN ENGLAND. DRY FILTRATION IN FILTERING DUST COLLECTORS. *(Erfahrungen in England. Trockenfiltration mit filternden Entstaubern). Text in German. Wasser Luft Betrieb, 16(10):356-359, 1972. 8 refs.*

Filtering dust collectors are of a different design in England than they are on the Continent. The diameters of filter bags are much smaller in England than in Germany, 5 to 6 inches (127 to 152 mm) versus 190 to 200 mm in Germany. Through the smaller sizes of the filter bags, more dust can be accommodated so that actually English filters have a higher capacity. The chambers are larger and a lower filter load is always maintained. For mechanical cleaning of fabric filters they swing back and forth. Air jets are also used for cleaning. As a filter material, mostly cotton is used. The fabric is generally denser and heavier than in Germany. Synthetic fibers are mostly made of polyester. In asphalt plants there is a clear trend toward the use of fabric filters instead of the wet filters used before. Glass fibers are mostly used for this purpose.

25167 **APTIC NO. 46910**

Bernhardt, W. E. and E. Hoffmann

METHODS FOR FAST CATALYTIC SYSTEM WARM-UP DURING VEHICLE COLD STARTS. *SAE (Soc. Automot. Engrs.) Spec. Pub., no. 370:1-23, May 1972. 7 refs. (Presented at the National Automobile Engineering Meeting, Detroit, Mich., May 22-26, 1972, Paper 720481.)*

During vehicle cold start, emissions, mass flow rates, and catalytic converter space velocities vary by orders of magnitude. Therefore, catalytic exhaust control systems must be designed to operate at high efficiency almost from the moment of engine start-up, and catalysts must reach their operating temperature as quickly as possible. The utility of different methods for improving the warm-up characteristics of catalytic systems is illustrated. A very elegant method to speed the warm-up is the use of the engine itself as a preheater for the catalytic converters. High exhaust gas enthalpy to raise exhaust system mass up to its operating temperature is obtained by the use of extreme spark retard, stoichiometric mixtures, and fully opened throttle. Intensive studies to investigate the effects of concurrent changes of spark timing and air/fuel mixtures on exhaust gas temperature, enthalpy, oxides of nitrogen, and hydrocarbon emissions are discussed. Nitrogen oxide catalyst characteristics are dealt with, because the NOx catalyst is the first in a dual-bed catalytiystem. The NOx catalyst should have high activity, low ignition temperature, and good warm-up performance. If the NOx catalyst has a fast warm-up rate, this would result even in a significant improvement in the warm-up characteristic of the HC/CO bed. (Author abstract modified)

25168 **APTIC NO. 46438**

Bialecki, Zbigniew

HIGH CAPACITY PACKED COLUMN (BIALECKI RINGS). *(Hochleistungs- Kolonnen-Fuellkoerper (Bialecki-Ringe)). Text in German. Chem. Ind., 24(9):543-545, 1972.*

New rings for packed columns were designed for the achievement of a better contact between the liquid and gaseous phase. The new rings are called Bialecki rings after its inventor. Bialecki rings differ from other rings by the shape of the grooves into the superficies. They have the shape of alternate triangles. The specific surface of these rings is 10% larger than that of the Raschig rings and 2% larger than that of the Pall-rings. Independent of the type of arrangement of the Bialecki rings, a good distribution of the liquid and gas throughout the column is obtained. On the sharp corners of the triangular planes the liquid jets are broken up into droplets. The rings are very sturdy so that a thinner wall can be used and material can be saved. Studies have shown that only a 32 m high packed tower causes a permanent deformation of the lowermost ring. The rings may be made of metal, ceramic, synthetics. Parallel experiments with Bialecki and Raschig rings for the absorption of carbon dioxide on water under normal conditions showed that with rings of the size 12 by 12 by 0.3, a 177% increase of the substance exchange coefficient was achieved.

25169 **APTIC NO. 46580**

Black, J. W. C., R. M. Cooper, and D. T. Rattray

POLLUTION ABATEMENT IN THE CANADIAN PAINT INDUSTRY. *Am. Paint J., 57(9):69, 72, 74-75, 77, Sept. 18, 1972. (Presented at the International Anti-Pollution Coating Seminar, 1st, Chicago, Ill.)*

Various emission sources and pollution control methods within the Canadian paint industry are reviewed. Pollution potentials within the industry include air contamination from the emission of disagreeable odors associated with resin manufacture or emissions resulting from industrial application or curing of paint coatings; contamination of municipal sewer systems by waste products in plant effluents; disposal of miscellaneous solid and liquid wastes; and the use of materials considered hazardous to the environment. The manufacture of protective coatings may generate many potential atmospheric pollutants, with oils, resins, and solvents as the major components. Resin manufacture processes can emit fumes containing aldehydes, ketones, esters, alcohols, and phenols. The application of industrial finishes contributes to air pollution, with the curing of paint films as the main source. Evaporation and vaporization during the spraying of paint coatings also results in organic solvent losses. The major abatement techniques include the use of closed kettles within the operations, efficient scrubbers, reflux condensers, odor control through incineration, and restrictions placed on the type and quantity of solvents used in the industry. Canadian legislation and regulations are mentioned.

25170 **APTIC NO. 46957**

Blakey, P. B.

ECONOMIC REDUCTION OF GRIT, DUST AND FUME EMISSION. *Chem. Process. (London), 18(1):29, 31, 33, 35, Jan. 1972. 6 refs.*

The mechanism of collection of gases differs from that for solids and only on rare occasions can the same collector be used for both. Efficiency of removal for gases is a continuous process dependent on interfacial area or contact time and has no arbitrary cut-off point which is dependent on particle size. The necessary course of action when considering gas absorption is, therefore, very straightforward and once the necessary level of collection efficiency has been established then only a decision as to whether to collect by liquid scrubbing or solid absorption is required. With solid collection, however, it is essential to learn something about the physical characteristics of the solid being produced in the process under consideration. Particle size and removal efficiency are discussed. Some commonly used low efficiency collectors include settling chambers and cyclones; medium efficiency collectors include spray scrubbers and various cyclones; high efficiency collectors include electrostatic precipitators, fabric filters, and venturi and impingement scrubbers.

25171 **APTIC NO. 47053**

Bockris, J. O M.

ELECTROCHEMICAL SCIENCE AS THE BASIS TO A NON-POLLUTING FUTURE TECHNOLOGY. (Osen o shojiaai mirai gijutsu no kiso to shite no denki kagaku). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 8(10):985-996, Oct. 1972. 13 refs.

Pollution problems in relation to exhausting natural resources and some solutions for the future from the standpoint of electrochemical science are discussed. As problem sources, automobile exhaust gas, carbon dioxide and aerosols are briefly discussed. The earth s resources are predicted to be exhausted sometime around 2050. Energy sources for substitution of resources such as coal and gasoline, which are sources of pollution, include atomic energy, solar energy, subterranean heat, tidal energy, and wind energy. In place of gasoline engine motor vehicles, battery operated automobiles are possible. Other resources such as water and food and their conservation and solution by synthesis are suggested. A future society as a totally related composite system, with its built-in energy recycling concept is discussed.

25172 **APTIC NO. 46702**

Brant, Lynn A.

WINTER SANDING OPERATIONS AND AIR POLLUTION. *Public Works, 103(9):94-97, Sept. 1972. 4 refs.*

Winter sanding operations contribute to a large degree to the total street dust in urban areas. Dust from winter sanding operations is generated in two ways: the dust applied directly to the street during sand applications and the dust created by the tires of vehicles while the sand is on the street surface. To determine the potentials of air pollution and health hazards from these operations, sanding materials used in representative Montana cities were sampled for quantities used, components, and particle sizes. Methods to reduce dust from sanding operations are also examined, including complete elimination of the use of all sand; limited application; application of sand with an absolute minimum of fines; selecting sands only of quartzitic or granite compositions; and cleaning and sweeping streets.

25173 **APTIC NO. 46404**

Bronsard, Joseph A. and Richard F. Toro

ODOR CONTROL OF PAPER RECYCLING. *Pollut. Eng., 4(5):18-19, Aug. 1972.*

A recycling operation at a paper plant helped reduce solid waste but created air pollution problems. Although odors could not be quantified or measured definitively and were well below legal limits, nearby residents complained. Air pollution stemmed from small amounts of oil (150 ppm) from sources such as solvent-based inks which evaporated into a large volume of air (120,000 scf/min) and picked up water vapor at the rate of 800,000 lb/day. The pollutants were then exhausted from five huge dryers which remove moisture from fiberboard made of waste paper. Methods of solving the problem were evaluated according to performance and costs. They included scrubbers (low pressure-drop and high pressure-drop venturi), wet electrostatic precipitators, high and low velocity filtering systems, combustion in existing boilers, and recyling of drying air. A simple, relatively low cost mist eliminator entrainment separator system was finally adopted as the best cost/effectiveness solution.

25174 **APTIC NO. 46624**

Burkert, Rudolf

REMOVAL OF AMMONIA FROM COKE OVEN GASES. *(Verfahren zum Beseitigen von in Koksofengasen enthaltenem Ammoniak). Text in German. (Didier-Werke AG, Wiesbaden (West Germany)) Ger. Pat. 2,045,323. 8p., March 16, 1972. (Appl. Sept. 14, 1970, 3 claims).*

Ammonia vapor stripped from the wash water of coke oven gases was concentrated by cooling to a flammable concentration at less than 0.21.1 water:NH_3 molar ratio and 55 C. This mixture was passed into a combustion chamber and burned with air to give nitrogen and steam. A less concentrated mixture of NH_3 with air was passed into the hot gas stream at an automatically controlled rate. The combustion heat of the more concentrated mixture was used for heating the less concentrated gas mixture.

25175 **APTIC NO. 46408**

Constance, John D.

CALCULATE EFFECTIVE STACK HEIGHT QUICKLY. *Chem. Eng., 79(19):81-83, Sept. 4, 1972. 9 refs.*

When an emission control system is designed the acceptable ground level concentration must be decided based on odor threshold, air pollution ordinances, and meteorologic conditions such as inversions. Hydrogen sulfide is given as an example. A graph based on the Bosanquet-Pearson formula shows the maximum concentration of contaminants in the atmosphere at a mean wind velocity of 1 mi/hr. The maximum concentration can be determined for a distance x and a crosswind at a distance y from an elevated source of effective height, H, from which the gas or vapor is emitted at a constant rate. The effective stack height is the sum of physical stack height, plume height caused by the velocity of the stack gases, and the rise of the plume. The effective height to which the stack plume carries before it begins to turn downward is the actual height of the stack plus the plume rise created by the sum of the exit velocity and the difference in density above the plume. A sample calculation of the effective stack height is given.

25176 **APTIC NO. 46685**

Cox, Lionel A. and H. E. Worster

A STATUS REPORT ON MACMILLAN BLOEDEL S HYDROGEN SULPHIDE-KRAFT PULPING PROCESS. *Pulp Paper Mag. Can. (Quebec), 73(9):106-109, Sept. 1972. 6 refs. (Presented at the Chemical Pulping and Bleaching Conference, Vancouver, British Columbia, Nov. 1-3, 1971, Paper T250.)*

A hydrogen sulfide pretreatment kraft pulping process was developed to increase pulp yield. The pulping and bleaching processes, pulp properties, and pilot plant results are examined. The process will not cause any more pollution than conventional kraft pulping and may result in reduced air pollutant emissions since the black liquor contains less organic matter, resulting in a smaller load on the recovery furnace.

25177 **APTIC NO. 46864**

Craig, J. W. T., G. L. Johnes, G. Moss, J. H. Taylor, and D. E. Tisdall

STUDY OF CHEMICALLY ACTIVE FLUID BED GASIFIER FOR REDUCTION OF SULPHUR OXIDE EMISSIONS. (FINAL REPORT). *Esso Research Centre, Abingdon (England), Office of Air Programs Contract CPA 70-46, EPA R2-72-020, 345p., June 1972. 9 refs.*

NTIS: PB 211438

A chemically active fluid bed process for heavy fuel oil gasification and desulfurization in a fluidized bed of lime particles was studied in a series of experiments in batch reactors and operation of a continuous, two-reactor, pilot plant. Fuel and limestone were screened and the the effects on sulfur removal of limestone particle size, bed depth, superficial gas velocity, air/fuel ratio, and temperature were studied. Gasification temperature and air/fuel ratio interacted strongly. With gasification temperatures of 870 C or higher, air/fuel ratios as low as 20% of stoichiometric were used with greater than 95% sulfur removal efficiency. At temperatures above 900 C, however, sulfur removal efficiency declined. At low lime utilizations, removal efficiency varied inversely with the square of limestone particle size. The results and conclusions of pilot plant operation are also presented.

25178 **APTIC NO. 46782**

Cross, Frank L., Jr., J. Ronald Lawson, Charles C. Miesse, and William D. Sitman

ENVIRONMENTAL ASPECTS OF SITE SELECTION FOR A PETROLEUM REFINERY. *Ind. Wastes, 18(4):17-22, July/Aug. 1972. 12 refs.*

A hypothetical 100,000 barrel/day refinery is discussed. An uncontrolled refinery could emit up to 17,000 lbs/hr particulate and gaseous emissions; with the latest control equipment, only 1700 lbs/hr would be emitted. The principal sources in the refinery would emit sulfur dioxide, particulates, hydrocarbons, nitric oxide, and carbon monoxide. One of the basic control systems at a refinery is an electrostatic precipitator of 95% efficiency to remove particulates from the catalytic cracker. carbon monoxide from this process is burned in a boiler. Hydrogen sulfide could be converted to sulfur or sulfuric acid in a sulfur recovery plant. An incinerator for burning waste sludge can be equipped with a wet scrubber, and the flares would have steam injection systems to convert CO to carbon dioxide, reducing visible emissions to a minimum. Stability conditions and wind velocity and direction for Providence, R. I., plus data on pollution produced by the refinery were the input for a mathematical diffusion model which yields an overall picture of air quality in the area. The refinery would emit 1600 t/yr SO2, while other pollution sources in the area such as transportation, fuel combustion, electric power production, and refuse disposal now contribute 139,000 t/yr. The refinery would emit only 1300 t/yr CO, whereas the general regional contribution is now 437,000 t/yr. Water pollution, solid waste, and noise are also discussed.

25179 **APTIC NO. 47065**

Eberan-Eberhorst, R.

WAYS TO CLEAN AUTOMOBILE EXHAUSTS IN THE NEAR FUTURE. *(Wege zu sauberen Autoabgasen in naher Zukunft). Text in German. Automobiltech. Z. (Stuttgart), 74(11):425-430, Nov. 1972. 15 refs.*

Methods for engine and combustion process modification with the aim of reducing pollution from automobile exhausts are reviewed. Although the carburetor engine is entirely satisfactory concerning driveability, the fuel-to-air mixture prepared in the carburetor is by no means homogeneous. It comprises four phases: air, gaseous fuel vapor of the volatile gasoline-hydrocarbons, micro-fuel droplets, and a fuel film stemming from the higher boiling gasoline hydrocarbons. The four phases are transported with various velocities and cause changes in the mixing ratio of air/fuel at the opening and closing of the throttle valve and at increasing and decreasing rpm. Most of the time a rich mixture is produced giving high carbon monoxide and hydrocarbon emissions. Other causes for the pollutants are a bad mixture distribution and the cyclic fluctuations of the combustion process. A switch to a divided combustion process and to operation with a lean mixture seems to be the most promising solution because it eliminates all major pollutants.

25180 **APTIC NO. 46712**

Elias, Giacomo, Giancarlo Chiesa, and Alberto Ciminale

APPLICATION OF A STATISTICAL MODEL BASED ON AN ANNULAR ASCENDING TWO-PHASE FLOW TO THE CONTROL OF PARTICULATE EMISSION. *(Applicazione di un modello statistico alla risoluzione di un problema di dipolverazione basato su un flusso anulare ascendente). Text in Italian. Termotecnica (Milan), 26(8):425-430, 1972. 5 refs. (Presented at the Congresso Nazionale ATI, 26th, L Aquila, Italy, Sept. 22-25, 1971.)*

The experimental use of an anular ascending two-phase flow for the separation of solid particles from turbulent dust-laden gas streams agreed with results obtained by a mathematical model. The experimental arrangement consisted of a ventilating section blowing filtered air into the testing section attached to a flow and pressure meter. Immediately before the inlet into the testing column, dust and the liquid are injected. At the inlet and at the outlet, the content of suspended particulates in the flow is measured with the difference denoting the degree of dust control. At the outlet the liquid phase is separated from the gaseous phase whose residual particulate content is determined while the liquid phase is recirculated. The test column was a 50-150 cm long, 1.6 cm thick aluminum tube; the wall consisted of a thin ascending liquid film whose velocity was governed by the gas flow velocity. Experimental data for different Reynold numbers and different test sections were checked against calculated results and an essential agreement was noted.

25181 **APTIC NO. 46567**

Engels, Lothar -H.

COMBATING THE DUST AT THE WORKING PLACE - A SURVEY OF THE TECHNICAL MEASURES FOR THE IMPROVEMENT OF THE CONDITIONS IN WORKING PLACES OF THE INDUSTRY. *(Staubbekaempfung am Arbeitsplatz - Uebersicht ueber technische Massnahmen zur Verbesserung der gewerbehygienischen Verhaeltnisse an Arbeitsplaetzen der obertaegigen Industrie). Text in German. Staub, Reinhaltung Luft, 32(9):353-356, 1972.*

Dusts developing at industrial working places by process modification can be abated by proper ventilation and by automation. After a brief discussion of all these measures, dust removal facilities from exhaust hoods to dust collectors are discussed. The exhaust system for drawing off the dust at the point of development usually comprises the hood, the pipes, and the fan. Ten different designs of exhaust hoods are shown in a drawing. The selection of the adequate dust collector depends on the particular production process, the mode of operation and on the type, concentration, and grain size distribution of the dust to be separated. All major dust collectors from dry ones to wet collectors and to electrostatic precipitators are enumerated.

25182 **APTIC NO. 46625**

Eugenson, A. S., V. V. Fryazinow, V. Kh. Malikov, H. A. Berg, B. M. Ezhov, G. A. Vorms, Yu. S. Sabadash, V. S. Akimov, N. I. Dobrozrakova, R. Kubitschka, and J. Weprschek

TREATMENT OF HEAVY, SULFUR-CONTAINING PETROLEUM DISTILLATION RESIDUES TO FORM LOW-SULFUR MOTOR AND BOILER FUELS. *(Verfahren zum Verarbeiten von schweren schwefelhaltigen Erdoeldestillationsrueckstaenden zu schwefelarmen Motortrieb- und Kesselheizstoffen). Text in German. (Bashkir Scientific Inst. of Petroleum Refining Ufa (USSR)) Ger. Pat. 2,034,343. 27p., Jan. 13, 1972. (Appl. July 10, 1970, 4 claims).*

Heavy, sulfur-containing petroleum distillation residues can be heated to 140-190 C and deasphalted countercurrently with light gasoline at 140-155 C and 20 atm. The asphalt phase is withdrawn from the extractor in liquid form. The deasphalted phase is hydrocracked in the presence of a cobalt-molybdenum catalyst on alumina at 380-430 C, 100-300 atm, and a hydrogen vol ratio of 500-1000:1, forming a product which contains 8% gasoline, 31% diesel fuel, and 30% fuel oil with minimum amounts of sulfur present.

25183 **APTIC NO. 46668**

Fano, V.

REDUCTION OF SMOKE EMISSION BY DIESEL ENGINES THROUGH THE USE OF COMBUSTION MODIFIERS. *(Sulla riduzione della fumosita dei motori Diesel mediante l impiego di additivi migliatori della com-*

bustione). Text in Italian. Riv. Combust. (Milan), 26(6):247-253, June 1972.

While the emission of carbon monoxide by internal combustion engines is much higher than by diesel engines, the volume of gases emitted by diesels is up to 50 times higher than the volume emitted by internal combustion engines. Diesels are mostly badly adjusted which increases smoke emission. Aside from black smoke, diesels emit white smoke (or blue), aldehydes, nitrogen and sulfur oxides, and hydrocarbons and carbon particles in aerosol form. Combustion modifiers, which act as catalysts of the reaction between carbon and oxygen yielding carbon dioxide, prevent dehydrogenation and cracking of hydrocarbons by high temperatures and pressures prevailing in the combustion chamber and prevent polymerization of free radicals and the formation of macromolecules rich in carbon. The alkaline nature of the additive also preserves pistons and rings and has other desirable properties. Tests with the additive FINA SLD (Smoke-Less Diesel) performed on a test bench and in traffic with Fiat, Alfa Romeo, Lancia, and OM buses with diesel fuel to which 0.25 vol% of the combustion modifier was added reduced smoke emission by from 8 to 64% expressed in Hartridge Smokemeter Units and thus contributed to the implementation of Law No. 615 regulating emissions from diesel engines.

25184 **APTIC NO. 46612**

Fujita, Hiroyoshi and Itsuo Saito

MANUFACTURING METHOD FOR FILTER MATERIAL. *(Rokatai no seizo hoho). Text in Japanese. (Assignee not given.) Japan Pat. Sho 47-38504. 3p., Sept. 28, 1972. (Appl. July 1, 1969, 1 claim).*

Inorganic acid (1.5% sulfuric acid, for instance) is added to furfuryl alcohol and stirred. The temperature rises 130 to 170 C, and a radical reaction of polymerization occurs, thickening the substance into a viscous plastic. A particularly drastic temperature rise occurs between 50 C and 100 C. The explosive reaction is controlled by the use of an appropriate cooling method, and the resin liquid is neutralized before completely settling, retaining 10 to 20% of unreacted gas. A binder is prepared by adding an inorganic oxidation agent to this viscous resin. It is then poured into a frame made of particles of activated carbon, zeolite, activated aluminum, silicagel, silica, and a fiber or metal mesh. The proportion of the volumes of the binder to the frame should be one to two. The frame bound by the plastic material is solidified and used as a filter, which is effective for liuqid or gas.

25185 **APTIC NO. 46882**

Gaemmerler, H.

AMMONIA SCRUBBER. *(Ammoniak-Wascher). Text in German. Aufbereitungs-Technik, 13(9):597-599, 1972.*

Two ammonia scrubbers were installed in the steel plant in Duenkirchen, France. The scrubbers have an inner diameter of 5000 mm and a total height of 27.2 m. The scrubbers were designed for an operating pressure of minus 1100 mm to 2000 mm water at a temperature of 50 C. The pipelines for passage of the coking gases were designed for a pressure of minus 900 to plus 650 mm water at an operating temperature of about 30 C.

25186 **APTIC NO. 46574**

Gal tsov, V. A., V. A. Krasnov, and Ye. G. Korolev

VORTEX FAN FOR SUCTION SYSTEMS. *(Vikhrevoy ventilyator dlya sistem aspiratsii). Text in Russian. Vodosnabzh. i Sanit. Tekhn., no. 6:24-28, 1972. 7 refs.*

A vortex fan designed for workplace exhaust systems in textile industry and in precision machine shops after a Siemens model is described. The dimension of the fan weighing 12 kg are 300 by 300 by 300 mm. A maximum efficiency of 0.29 at a rotation speed of 2930 rpm, a throughput capacity of 90 cu m/hr and a pressure of 600 kp/sq m was reached. The power requirement under such conditions was 0.4 kW. As the aerodynamic characteristics deteriorate with increased clearances between the impeller and the casing, radial and end gaps of 0.25 mm and 0.20 mm as well as the use of filter are recommended. Moreover, the throughput capacity of the vortex fan should not be less than 20% of the maximum value for the same speed. The noise generated by the fan is well below the allowable level.

25187 **APTIC NO. 46925**

Gasiorowski, Kurt

WASTE GAS COMPOSITION AND MAINTENANCE OF CLEAN AIR WITH OIL AND GAS HEATING. *(Abgasfragen und Luftreinhaltung bei Oel- und Gasfeuerungen). Text in German. VDI (Ver. Deut. Ingr.) Z. (Duesseldorf), 114(14):1043-1047, Oct. 1972. 16 refs.*

The majority of substances composing fuel oils are formed by carbon and hydrogen. They also contain organic compounds such as sulfur, nitrogen, oxygen, and various metals. The combustion gases contain sulfur in organic or inorganic form such as mercaptans, hydrogen sulfide, or carbonyl sulfide. The problem of sulfur dioxide emission is discussed. The most widely used method of avoiding these emissions is the desulfurization of fuels. In the German Federal Republic this method is practiced with natural gases and with light fuel oils. The sulfur production from these two sources will exceed 500,000 tons/yr by the mid-seventies. The desulfurization of heavy fuel oils has been tested since 1967 in experimental plants on a commercial scale. The results so far have not been very encouraging but give hope. The emission of ash plays a negligible role with light and heavy fuel oils and fuel gas. Also, the fluorine emissions by these fuels are low; light fuel oil and natural gas contain no fluorine; heavy fuel oil is assumed to contain 1 to 10 mg/kg. There are also process-dependent emissions such as carbon monoxide, soot, fly ash, hydrocarbons, polynuclear aromatics, and the oxides of nitrogen. The most important cause for such emissions is the lack of air or oxygen. Another cause is an air surplus. Measures for reducing these emissions are reviewed, e.g., the proper fuel oil for the size of the heating system, good adjustment of fuel oil atomization, good agreement between the shape of the flame and the shape of the combustion chamber, proper supply of combustion air, and avoidance of temperature drops below the dew point.

25188 **APTIC NO. 46951**

Genkin, V. S., V. V. Dil man, and S. P. Sergeyev

GAS FLOW DISTRIBUTION IN THE HEIGHT OF THE CATALYST LAYER IN RADIAL CATALYTIC REACTORS. *(Raspredeleniye gazovogo potoka po vysote sloya katalizatora v radial nykh kontaktnykh apparatakh). Text in Russian. Khim. Prom. (Moscow), no. 2:60-63, 1972. 8 refs.*

The gas flow distribution in the height of the catalyst layer of U and Z-type radial catalytic reactors is calculated. The efficiency of radial reactors is strongly dependent on the flow distribution across the catalyst layer and on the geometrical parameters of the reactor. An energy equation of the gas flow in radial direction in single chamber reactors, considering a friction coefficient for the catalyst layer, is given. The static pressures in the central tube and in the annular gap are in connection with each other. U-type reactors are more favorable for a uniform gas flow distribution than Z-type ones at the same geometry, and the problem of uneven gas flow distribution is most acute in reactors with small height. Reductions of the free cross section of the perforations in the central tube and the chamber wall result in improved gas distribution, and so do, in most cases, increased annular gaps and reduced central tube diameters.

25189 **APTIC NO. 46509**

Gertseva, M. I., G. M. Gordon, and R. P. Karpova

DEVELOPMENTAL TRENDS IN THE ELIMINATION OF DUST (ACCORDING TO PATENT MATERIALS). *(Napravleniya razvitiya pyleulavlivanniya (podannym patentnykh materialov)). Text in Russian. Tsvetn. Metal., 45(3):14-20, 1972. 69 refs.*

The patent literature on dust removal is reviewed. Topics discussed include: electrostatic filtration gas conditioning, ionization, aerodynamics, rapid filtration, coronizing and pptg electrodes, dust removal from electrodes, and high voltage supply; centrifugal dust collectors; and wet dust collectors -- scrubbers with and without packing, and venturi and miscellaneous scrubbers.

25190 **APTIC NO. 46933**

Griem, Michael

WASTE AIR CLEANING TECHNOLOGY GOES NEW DIRECTIONS. *(Ablufttechnik auf neuen Wegen). Text in German. Tech. Umweltmag., (10):46, 49, 1972.*

For cleaning waste air there is an increasing tendency to use scrubbers, synthetic packing material, and synthetics in general as material. The cross-flow scrubber is increasingly being used. It has low pressure loss because the phases meet in a right angle and not head-on. Cross-flow scrubbers with synthetic packing material are capable of cleaning gases with up to 2000 mg dust/cu m. As a packing material, spiral disks of polyethylene or polypropylene have come into use. They provide an optimum number of contact points. As material for the scrubber itself, glass-fiber-reinforced synthetics are particularly useful, since the ratio of strength to weight is particularly high. An interior resin coating renders the casing rather corrosion-resistant.

25191 **APTIC NO. 46707**

Grunbaum, Tommy

POLITICKING PREVAILING OVER TECHNICAL APPROACH TO AUTOMOTIVE EXHAUST PROBLEMS. *(Mer politik an teknik i bilavgaser). Text in Swedish. Tek. Tidskr., 13(102):18-19, 21-22, Sept. 1972.*

Specific problems of the adoption of exhaust emission standards in Sweden, and achievements in the area of catalytic afterburners are described. Positive crankcase ventilation for new car models has been required since 1969, and the carbon monoxide emission is limited to 4.5%. Adoption of the ECE or the USA 73 standard represents the basic options to be decided on by the Swedish government this fall. Adoption of the ECE standards would mean an even higher emission level than allowed presently in Sweden, while the imposition of the USA 73 standard for 1975 car models, strongly advocated by Sweden for all of Europe, might chip off Swedish car exports to European countries. At the same time, 2/3 of all 1972 Swedish car models were equipped with exhaust control devices comparable to those required in the USA. Catalytic afterburners, monolithic or particulate, represent perhaps the only possible solution to drastically reduce automotive emissions. Monolithic catalysts have the advantage over particulate types of higher efficiency, which cost more. The use of catalysts requires lead-free gasoline and adequate solutions to reduce the exhaust temperature prior to treatment. A catalytic afterburner prototype developed by Saab-Scania has a life of 16-30,000 km, and another experimental device by Volvo has a replacement cycle of 45,000 km. Photochemical smog over Stockholm and Goteborg was detected in 1971.

25192 **APTIC NO. 46776**

Haas, Leonard

LATEST CANADIAN MARKET PULP MILL. *Pulp Paper Int., 14(9):31-34, Aug. 1972.*

A 500-ton/day market pulp mill was started up in interior British Columbia. The mill is very closely integrated with a large sawmill and studmill so that a minimum of roundwood is pulped. The operation and technology of the mills are reviewed. Of the $65 million spent on building the pulp mill, 7% or $4.5 million was for effluent treatment and air pollution abatement. Pollution controls include a modified design storage tank for concentrated black liquor to prevent odors; precipitators with a collection efficiency of 99.5%; steam stripping of foul condensates; and odorous gas recovery and destruction to sulfur dioxide in the lime kiln.

25193 **APTIC NO. 46441**

Helling, S. and H. Eckhardt

DEVELOPMENT OF A METHOD FOR STABILIZING THE TAR FROM SOFT COAL HIGH TEMPERATURE COKING. *(Entwicklung eines Verfahrens zur Stabilisierung des bei der Braunkohlenhochtemperaturverkokung anfallenden Teeres). Text in German. Freiberger Forschungsh. A, 507:47-59, 1972. 5 refs.*

The tar obtained from high-temperature coking poses considerable difficulties if used as fuel oil. Through its instability, solid matter separates during storage and incrustations are formed at the combustion. Its low sulfur content of 0.4% would make it an ideal fuel, however. It was possible to improve the thermo-chemical stability of the tar considerably. The most economical and most favorable method turned out to be the gassing the tar with ammonia. Further study of this method showed that iron as material for the gassing column has a negative effect on the stabilization. Glass, chromium-nickel steel or enameled iron are better materials. With the ammonia-gassing method, a low-sulfur fuel oil can be obtained which has the stability of conventional fuel oils.

25194 **APTIC NO. 46589**

Herrmann, Walter and Herbert Welzer

REDUCING THE WASTE GAS TEMPERATURE BY AN OPTIMUM DESIGN OF THE AIR PREHEATER. *(Beitrag zur Senkung der Abgastemperatur durch eine optimale Auslegung der Luftvorwaermer). Text in German. Energietechnik, 23(9):394-399, 1972.*

The optimum use of the fuel requires an operation of the steam boiler with a high degree of efficiency, which can be largely achieved by reducing the waste gas temperature in the boiler. The waste gas temperature may not drop below the dew point temperature, however. The laws governing the temperatures of flue gases and air were studied in connection with the wall temperatures which can be expected in the air preheater. The dependency of the various temperatures on each other is shown in a diagram. The fuel to air ratio and the amount of preheated air in the primary air have a decisive influence on the waste gas temperature. An increase of the fuel to air ratio produces a higher waste gas loss due to the higher waste gas volume and thus, despite the lower waste gas temperature, the degree of efficiency drops. A considerable improvement of the efficiency can be achieved by the amount of preheated air in the primary air. A high degree of efficiency can also be achieved by high flue gas and low air velocities.

25195 **APTIC NO. 46703**

Hulewicz, Zbigniew Z.

THE INFLUENCE OF SCRUBBER PACKING POROSITY ON PARTIAL COEFFICIENTS OF AEROSOL PARTICLE DEPOSITION. *(Wplyw porowatosci wypelnienia skrubera na wspolczynniki czastkowe osadzania czastek aerozolowych). Text in Polish. Inz. Chem., 2(2):329-341, 1972. 10 refs.*

The effect of packing porosity on variations in partial coefficients of aerosol particle deposition was investigated using an experimental counter-current scrubber with a porous filter layer. The packing of the scrubber was Raschig rings with porosities of 0.776, 0.825, and 0.872. The superficial velocity of the aerosol stream covered the range of 5-50 cm/sec. Based on three unitary mechanisms, i.e., inertial, diffusion, and direct interception, an overall aerosol particle deposition coefficient, calculated from an equation on the basis of the measured values of emission coefficients, was divided analytically into three partial coefficients. For the fixed value of Reynolds number, the inertial and diffusional coefficients increased with the drop of packing porosity. The coefficient of direct interception increased slightly with the increase of packing porosity in the measured range of this parameter. All the partial coefficients tended to zero when the Reynold s number tended to zero.

25196 **APTIC NO. 46598**

Hultgren, Evert

EXHAUSTION ARRANGEMENT AND ENVIRONMENTAL CARE AT SPRAY PAINTING PLANTS. *(Utsugningsanordningar och miljovard vid sprutmalning). Text in Swedish. Kontos. Ytskydd, 7(1-2):25, 27, 1972.*

Spray booths with exhaust systems for the separation of paint spray particles are described. Spray booths with labyrinth dry filter, separating paint particles on the centrifugal principle, have an efficiency of about 80%, and are not suitable for large-capacity surface-coating plants. New disposable filters reach efficiencies of 94-96%. Spray booths with water curtain between the booth and the exhaust, using water with pH adjusted to 10.5, have efficiencies above 99%. Cascade booth include powerful fan instead of pump for exhausting the air across cascade plates located in a water tank. Cascade booths with water curtain, operating in closed water cycle at efficiencies above 99%, are advantageous regarding the noise level. Spray booths for porcelain glaze are equipped with special water curtain with dry spray trap for the separation of some 80% by the spray trap and of 20% by the water curtain. Combinations of spray trap and bag filter with a total efficiency of over 99% are used mostly for large-scale operations. Spray booth waste gases, containing solvent vapors, can be evacuated by pipes led vertically downward with filter at their end, while large-capacity surface-coating facilities increasingly prefer catalytic afterburning for destruction.

25197 **APTIC NO. 46669**

Hyne, J. B.

METHODS FOR DESULFURIZATION OF EFFLUENT GAS STREAMS. *Oil Gas J., 70(35):64-78, Aug. 28, 1972. 46 refs.*

Twenty commercial methods for the desulfurization of tail gas from sulfur plants, stack gases, and other effluent gas streams are reviewed. Process selection for greatest efficiency must depend on the sulfur concentration in the final gas effluent, the condition of the gas stream, the presence of carbonyl sulfide and carbon disulfide; and end use for the by product. The basic chemistry of the desulfurization processes, economics, and critical parameters are examined. The process chemistry is reviewed for the dry limestone method, manganese dioxide process, active magnesia method, modified contact process, modified chamber process, activated carbon absorption, catalytic oxidation, sulfreen process, catalytic redox, carbon monoxide/SO2 redox, alkalized alumina, catalytic reduction, ammonia absorption, molten salt absorption, Claus process, solution oxidation, catalytic hydrogenation, and hydrolyzation. The various by-products recovered include sulfur, sulfuric acid, and sulfates.

25198 **APTIC NO. 46439**

Ingwersen, H. -H.

DESIGN AND OPERATION OF HEAT EXCHANGERS WITH LIQUID ORGANIC HEAT CARRIERS. *(Aufbau und Wirkungsweise von Waermeuebertragungsanlagen mit fluessigen organischen Waermetraegern). Text in German. Gesundh. Ingr., 93(9):257-264, 1972.*

Nowadays more and more indirect methods for heat transfer, heating, and cooling are used. Heat exchangers with liquid organic or inorganic heat carriers have reached particular importance. The various types of available heat carriers, e.g., eutectic salt melts of nitrites and nitrates, liquid metals (lead), and gaseous carbon dioxide or helium, are discussed. Heat exchanger systems, small or large, are all more or less the same, their main units are the heater, the container system, the pipes with pumps and armatures, and the consumer. Several illustrations and descriptions of differently designed heaters are presented. One heater shown is operated with waste heat. The waste gas is cooled from 1000 C to 350 C. The net heat capacity of the heater is 7.0 Gcal/hr. The pipes exposed to the waste heat are made of steel. About 30,000 cu m/hr of waste heat are fed to the heater.

25199 **APTIC NO. 46876**

Inoue, Ichiro

AIR POLLUTION BY NOX AND ITS COUNTERMEASURES. *(NOx osen to sono taisaku). Text in Japanese. Kagaku Keizai (Chem. Ind. Econ.), no. 11:10-17, Nov. 1972. 9 refs.*

Nitrogen oxides as pollutants, measurement methods for NOx, their influences on human health, environmental standards for NOx, emission sources, emission quantity, control methods, and NOx emission regulations in the United States are discussed. The total annual NOx emission along Tokyo Bay has increased from 87,300 tons in 1960 to 200,200 tons in 1965, to 443,800 tons in 1970, and it is expected to grow to 674,600 tons in 1975. Low oxygen driving and combustion is often discussed as a control method, however it still requires further research. At present, the two-step combustion method and 10 to 15% recirculation of combustion gas are recommended as control methods. The NOx emission can be decreased to approximately 200 ppm by these methods. Other methods that are recommended but require further research are: change of fuels, improved furnaces and burners, and denitrizaton of exhaust gases.

25200 **APTIC NO. 46912**

Inoue, T., K. Goto, and K. Matsumoto

TOYOTA STATUS REPORT ON LOW EMISSION CONCEPT VEHICLES. *SAE (Soc. Automot. Engrs.) Spec. Pub., no. 370:1-21, May 1972. (Presented at the National Automobile Engineering Meeting, Detroit, Mich., May 22-26, 1972, Paper 720487.)*

Low emission concept packages and their components are described, including: An oxides of nitrogen and hydrocarbon/carbon monoxide catalytic converter with exhaust gas recirculation; and a thermal reactor, catalytic converter, and exhaust gas recirculation system. Variations of thermal reactor design, performance, and durability characteristics are discussed. Above the throttle valve entry, exhaust gas recirculation had desirable flow characteristics with a simple control system. An exhaust gas recirculation rate over 15% brought about unacceptably poor driveability and fuel economy with smaller vehicles. Many types of catalytic converters for pelleted catalysts were designed and examined for their performance and durability. A down-flow type converter has relatively good flow distribution and warm-up characteristics. A few prototype vehicles met the 1975 Federal Regulation for HC and CO at low mileage, but the 1976 regulation for NOx of 0.4 g/mile is very difficult to meet even with a significant penalty in driveability and economy for smaller vehicles. (Author abstract modified)

25201 **APTIC NO. 46610**

Ishikawa, Toshio

METHOD OF ELIMINATING DUST FROM GAS CONTAINING DUST. *(Funjin o yusuru gasuchu no funjin o jokyo suru sochi). Text in Japanese. (Southern Kyushu Chemical Industries (Japan)) Japan. Pat. Sho 47-38786. 2p., Sept. 30, 1972. (Appl. Nov. 4, 1970, 1 claim).*

In this equipment, the dust containing gas enters from the side wall and is led downward by a buffer into a layer of cokes. A shed is attached to the inner wall of the dust collector at an angle of approximately 110 to 150 deg. At the top is a coke hopper which has three chutes which extend over the coke layer at an angle. The pipe for the discharge of gas after dust elimination is also installed at the top. The dust collector has a removal hopper at the bottom which has a rotary valve. The deteriorated cokes which cannot eliminate dust efficiently will be dropped on the table feeder below by opening the valve. There is a spray nozzle on the upper wall for spraying water when necessary. The shape of the buffer could be round, triangular, or square, but preferably should be approximately the same as the cross section of the dust collector and should be installed concentrically to the collector. The position of the buffer should be approximately perpendicular to the direction of the flow of the coke layer, and the entrance pipe for the dust-containing gas should be lower than the entrance opening to the dust collector.

25202 **APTIC NO. 46716**

Jarman, R. T.

THE IMPACT OF MODERN TECHNOLOGY ON THE ENVIRONMENT. THE POWER STATION AND THE ENVIRONMENT. *Plant Eng. (London), 16(8):16-24, Aug. 1972. 27 refs. (Presented at the Institution of Plant Engineers Conference, Annual, 26th, Harrogate, England, May 13, 1972.)*

Methods to control the effects of fossil-fueled power stations on the environment are reviewed. The three pollutants of principal concern produced by the combustion of solid and liquid fuels are smoke, dust, and sulfur dioxide. Most of the fine ash particles generated from coal-fired boilers are removed by electrostatic precipitators with collection efficiencies of 99.3%; oil-fired plants may use cyclone grit arrestors to reduce dust emissions. Tall chimneys of specified designs are used to reduce flue gas effects at ground level. Continuous monitoring of emissions and air quality surveys help to check on the efficiencies of these controls. Persistent chimney plumes of smoke are avoided by good control of combustion conditions, low sulfur content fuel, and effective operation and maintenance procedures. Fly ash collected by the electrostatic precipitators is often utilized as a by-product, thus enhancing the economic appeal of pollutant controls. The effects of thermal emissions and recirculated cooling water on lakes and streams and abatement methods to reduce their effects are also considered.

25203 **APTIC NO. 46715**

Jonas, Leonard A., Carlye M. Lochboehler, and William S. Magee, Jr.

AEROSOL FILTRATION BY FIBROUS FILTER MATS. *Environ. Sci. Technol., 6(9):821-826, Sept. 1972. 14 refs.*

The physical properties and aerosol filtration characteristics of filter mats were studied. Filter bulk densities ranged within 0.197-0.243 g/cu cm; fractional void volumes were within 0.845-0.883. Pressure drops of the filters were expressed as a function of the product of the mat thickness and the superficial linear velocity in a simple polynomial in conformity with Darcy's law for fluid flow through porous media. Filtration by the mats of 0.3-micron dioctylphthalate aerosols was expressed both by the equation relating aerosol penetration to filter pressure drop at any discrete flow velocity and by the Dorman equations. The Dorman flow regimes were consistent with the experimental data, and the parametric relationships confirmed the concept of a discrete velocity at which maximum aerosol penetration of a filter occurred. (Author abstract modified)

25204 **APTIC NO. 46831**

Jonke, A. A.

FLUIDIZED-BED COMBUSTION RELATED TO AIR POLLUTION. *Natl. Eng., 76(9):6-8, 10-12, Sept. 1972. 9 refs. (Presented at the Industrial Coal Conference, Annual, Lexington, Ky., April 12-13, 1972.)*

The combustion of fossil fuels in a fluidized bed of calcined limestone particles is a potentially efficient and economically attractive process for the generation of steam for electric power production and other uses. The process results in greatly reduced emissions of sulfur oxide pollutants, and, in many cases, greatly reduced emissions of nitrogen oxides and fine particulate matter. The process was demonstrated in several pilot plants in sizes up to 9 sq ft cross sectional area at coal feed rates up to 500 lb/hr. Development work is reviewed. (Author abstract modified)

25205 **APTIC NO. 46453**

Jorissen, H. Dieter

THE WASTE GAS PROBLEM IS NARROWED DOWN. ENGINE MODIFICATION ATTEMPTED-PROGRESS IN DETAIL - PRESENT STAGE OF RESEARCH WORK. *(Das Abgasproblem wird eingekreist. Motorische Loesungen angestrebt - Fortschritte im Detail - Zum Stand der Forschungsarbeiten). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 26(37):12, 1972.*

A survey is given of current research work in engine modifications to reduce the pollutants in exhausts of Otto and diesel engines. It is doubtful whether any meaningful results will be obtained in Europe in this respect within the time that is still available. The diesel engine has the best chance for success through divided combustion, waste gas return, waste gas turbo-charging, and variation of injection timing. The soot problem is a consequence of the operation of the engine under new and unknown conditions. No negative experience such as soiling of the engine has been made with waste gas return, something which caused considerable difficulty with Otto engines. A useful diesel engine testing method which takes European conditions into consideration will be at hand soon. At the moment, however, the human nose is still the best odor indicator. More than 1000 organic substances are in the exhaust gas. The odorous substances are estimated to number between 100 to 400. The load proved to be the most odor influencing factor. Efforts to improve the emissions of Otto engines such as careful fuel and air mixing by fuel evaporation had little success. Also, a delayed ignition brought no satisfactory results because, although the oxides of nitrogen were reduced, the fuel consumption rose by 30%. At present it looks as if the use of catalytic afterburning is indispensable, at least as a temporary measure.

25206 **APTIC NO. 46563**

Jorissen, H. Dieter

THE ENGINE MANUFACTURERS GO SEPARATE PATHS. *(Motorenbauer am Scheideweg). Text in German. Umwelt (Duesseldorf), 2(5):48-49, 1972.*

Engine manufacturers in the U. S. and Europe have taken different paths to solve exhaust gas emission problems. In the U. S. automobile engines shall be operated with less air than is necessary for complete combustion of the fuel in order to suppress the formation of the oxides of nitrogen. As a consequence, more carbon monoxide and more unburned hydrocarbons are found in the exhaust gas. They are burned in a thermal or catalytic afterburner. In Europe the operation of the engine with high air surplus is favored because less carbon monoxide and unburned hydrocarbons are produced. The higher emission of the oxides of nitrogen can be avoided by a divided combustion as it is applied with diesel engines. As much as the latter method would be desirable, it is far from any practical realization. Extensive developmental work is being conducted in this direction in West German Research Institutes but with very little success and slow progress.

25207 **APTIC NO. 46953**

Kafarov, V. V., V. L. Perov, A. Yu. Soshnikov, V. A. Ivanov, and Ye. T. Luchina

STUDY OF THE DYNAMISM OF THE NON-ISOTHERMAL ABSORPTION PROCESS IN INDUSTRIAL PACKED ABSORBER WITH RECYCLING. *(Iss-*

ledovaniye dinamiki protessa izotermicheskoy absorptsii v promyshlennom nasadochnom apparate s retsiklom). Text in Russian. Khim. Prom. (Moscow), no. 2:57-59, 1972. 3 refs.

A mathematical model of the dynamism of the non-isothermal absorption of formaldehyde in formalin production is presented. Recycling, the presence of stagnant zones, linear dependence of the water vapor present in the vapor-saturated gas on the gas temperature, permanent phase equilibrium being a linear function of the temperature, and negligible enthalpy of the apparatus were the basic assumptions for the model. A linearized and transformed Laplace equation of the relationship of the material and thermal balances in recycling is given. Theoretical and experimental data, obtained for the absorption of formaldehyde by determining the impulse characteristics of the column, showed good agreement, which indicates that the mathematical model provides a satisfactory description of the dynamism of the non-isothermal absorption process.

25208 **APTIC NO. 46871**

Kaneko, Yasuo and Yuhiko Kiyota

MITSUBISHI STATUS REPORT ON LOW EMISSION CONCEPT VEHICLES. *SAE (Soc. Automot. Engrs.) Spec. Pub., no. 370:1-12, May 1972. 1 ref. (Presented at the National Automobile Engineering Meeting, Detroit, Mich., May 22-26, 1972, Paper 720483.)*

During the past four years, Mitsubishi Motors Corporation has been active in the design and development of catalytic converter systems in the Inter-Industry Emission Control Program. Experience indicates that an effective dual catalytic converter, consisting of an oxides of nitrogen catalyst and a hydrocarbon/carbon monoxide catalyst, is indispensable to achieve the stringent IIEC targets, established on the basis of 1976 Federal Standards. However, there still remains a major difficulty of meeting the NOx target since nitric oxide is regenerated in the HC/CO catalyst in the dual converter system. Mitsubishi's efforts in seeking a breakthrough to control the NOx emission are described, as well as some noteworthy findings on transient nitric oxide concentrations at the inlet and outlet of HC/CO converter in an experimental dual converter. (Author abstract modified)

25209 **APTIC NO. 46952**

Karpenskiy, I. M., V. P. Solotovka, A. F. Dubovichenko, and M. M. Yefremov

INDUSTRIAL FLUIDIZED-BED EQUIPMENT FOR DRYING AND COOLING COMMON SALT. *(Promyshlennaya ustanovka dlya sushki i okhlazhdeniya chrennoy vyvarochnoy soli v psevdoozhizhennom sloye). Text in Russian. Khim. Prom. (Moscow), no. 2:56-57, 1972.*

An industrial fluidized-bed type equipment for the drying and cooling of common salt at a capacity of 1.6-3.2 t/hr is described. A mixture of the combustion products of natural gas, fired under pressure, with air is used for drying. The drying gas is maintained within a temperature range of 233-279 C, and the cooling air temperatures vary from -3 to +23.8 C. The specific natural gas expenditure is 7.4-14.1 cu m/t. The proportion of the salt carried away from the layer does not exceed 3-4%. The spent gases are treated in a cyclone before discharge into the atmosphere. The salt is dried to a residual moisture content of 0.25-0.3%, maximum.

25210 **APTIC NO. 46881**

Karpukhovich, D. T.

HELICAL INERTIAL DUST SEPARATORS. *(Ulitochnyye pyleuloviteli). Text in Russian. Vodosnabzh. i Sanit. Tekhn., no. 7:28-31, 1972.*

Recommendations concerning the design and the use of helical inertial dust separators are given. Such dry type dust separators, suitable primarily for medium-to-coarse fractions, concentrate the dust in a small proportion of about 8% of the admitted gas volume at the outer wall; the dust is then conveyed into a small-capacity cyclone by the pressure difference occurring between the gas and concentrated dust outlets. The minimum intake flow rate for the helical dust separator should be 20 m/sec, and that for the cyclone 10 m/sec. The efficiency for fractions larger than 30 micron varies from 70 to 95%. Formula describing the relationship between the efficiency and the diameter is given. It is best to use a twin helical dust separator instead of a single one for gas volumes exceeding 60,000 cu m/hr. Helical dust separators can be used alone or as a preliminary stage for cyclones, tissue filters, or electrostatic precipitators. A combination of a helical dust separator with a cyclone reached an efficiency of 99.2% for coal ash. Helical dust separators have the advantages of reduced hydraulical resistance and small dimensions.

25211 **APTIC NO. 47054**

Kawai, Misao

TREATMENT TECHNIQUES FOR TOXIC GASES. *(Yugai gasu shori gijutsu). Text in Japanese. Kankyo Sozo (Environ. Creation), 2(10):6-20, Oct. 1972. 19 refs.*

Installations that emit toxic gases and emission standards are reviewed in a table. The principle of gas absorption is reviewed and the gas-liquid double film (interface) theory is mathematically explained. Representative absorption towers such as a turbulent contact absorber, packed tower, spray tower, cyclone scrubber, venturi scrubber, and jet scrubber are briefly mentioned. Methods for absorbing toxic gases such as fluorine, hydrogen fluoride, silica fluoride, chlorine, and hydrogen chloride are discussed. Various methods of hydrogen sulfide elimination techniques such as the phenolate process, tripotassium phosphate method, the alkazid process, the amines, the iron oxide-dry-box process, the ferrox process, the Seaboard and vacuum carbonate process, the thylox process, the Fumaks process, the Takahax process, the alkaline liquors process, and the catalytic conversion to sulfur process are explained with chemical formulas and diagrams.

25212 **APTIC NO. 46418**

Kinder, Rainer, Armin Kirchner, Heinz Tieroff, Bernd Kurzmann, and Martin Finke

METHODS AND EQUIPMENT FOR PROTECTION OF THE ENVIRONMENT. *(Verfharen und Anlagen zum Umweltschutz). Text in German. Chem. Tech. (Berlin), 24(8):482-488, 1972. 14 refs.*

A survey of cleaning methods and equipment for waste water and waste air treatment in the East German chemical industry for organic raw materials is given. The list of processes emitting pollutants includes sintering, paraffin oxidation, polyvinyl chloride treatment, coffee roasting, synthetic leather production, cracking processes, and many more. Because of the great variety of pollutants many cleaning methods are available which include from condensation, adsorption, neutralization, and total oxidation processes. The methods of thermal and catalytic afterburning are reviewed in greater detail.

25213 **APTIC NO. 47059**

Kiyoura, Raisaku

METHOD TO PREVENT POLLUTION WITH SULFUR DIOXIDE. *(Aryusan gasu jogai hoho). Text in Japanese. (Tokyo Koatsu Chemical Co., Ltd. (Japan)) Japan. Pat. Sho 47-43754. 2p., Nov. 6, 1972. 2 refs. (Appl. Aug. 11, 1962, 1 claim).*

A dry-type desulfurization method was designed to recover sulfur dioxide in stack gas easily and economically as sulfuric acid. The SO2 in the stack gas is oxidized to sulfur trioxide by contacting the stack gas with a catalyst at a temperature ranging from 250 to 450 C. The stack gas containing the SO3 is then cooled to make the water content of the gas react with the SO3 to produce sulfuric acid mist. The sulfuric acid mist is

then separated from the stack gas. A suitable catalyst is either vanadium pentoxide, iron oxide, or platinum. If SO_2 is to be oxidized to SO_3 at a higher conversion rate in the comparatively low temperature range, a small amount of ozone is added to the stack gas to obtain the desired result. Part of the H_2SO_4 mist produced by the cooling process can be collected on the surface of the cooler, while the rest is collected by an electrostatic precipitator or a separator made of fine glass fibers. The dry method does not lower the temperature of the stack gas excessively during the desulfurization process, so that the treated gas can effectively diffused into the atmosphere. It can remove 70% or more of the SO_2 from the stack gas.

25214 **APTIC NO. 46915**

Kodera, Akira, Tetsuo Nishizaki, and Kajuji Fukunaga

MANUFACTURING METHOD OF ADSORBENT/DESORBENT WITH ACTIVE CARBON ON POROUS MATERIAL. *(Takoshitsu kizai ni kasseitan o fuchaku saseta kyudatchakutai no seizoho). Text in Japanese. (Kurare Co., Ltd., Kurashiki (Japan)) Japan. Pat. Sho 47-44153. 4p., Nov. 8, 1972. (Appl. July 30, 1969, 1 claim).*

A new method designed to manufacture, through attaching powdered active carbon to a basic porous material, an adsorbent giving high gas permeability, adsorption, and desorption is introduced. Active carbon of 60 mesh or smaller particles with surface pores of 10-100 A diameter, an emulsion type adhesive of 0.01-1 micron particle size, and a powdered-carbon dispersing liquid containing a heterocyclic sulfur oxide or an anion activator of its derivative or casein are attached to the basic porous material to make the adsorbent. The heterocyclic sulfur oxide or its derivative includes dinaphthyl disulphonate, naphthalene sulphonate, naphthalene sulphonic acid, formaldehyde condensate, and alkyl naphthalene sulphonic acid. The casein macromolecular substance is one of those made from milk. The optimum amount of the anion activator or casein to be added is 0.01-1 wt % for the anion activator or 0.1-2 wt % for the casein. The basic porous material can be non-woven cloth, foamed synthetic resin, bulky paper, or woven cloth. Best suited is non-woven cloth.

25215 **APTIC NO. 46868**

Kotov, N. A.

THE EFFECT OF SPRAY CARRIED AWAY ON THE EFFICIENCY OF GAS SCRUBBERS. *(Vliyaniye bryzgounosa na effektivnost gazoochistiteley). Text in Russian. Vodosnabzh. i Sanit. Tekhn., no. 7:31-34, 1972. 9 refs.*

Theoretical investigations on the effect of the carrying away of spray on the efficiency of wet-type gas scrubbers are described. The amount of the contaminants carried away with the spray is proportional to the amount of the spray and its impurity content. Formula for the calculation of the efficiency of the gas scrubbers and of the impurity concentrations in the recycled water for any number of cycles are given. The efficiency decreases and tends to go, theoretically, to zero with the increasing number of cycles. Foam-type equipment are responsible for less carry-away loss than other types, especially venturi scrubbers. The flow rate in foam-type equipment should not exceed 1.5 m/sec to limit the amount of spray carried away to 0.3-4 ml/cu m. The efficiency of the first plate in foam-type equipment is 0.65-0.70, and that of the subsequent plates is 70% of the above value. The specific amount of spray carried away from different types of cooling towers may vary from 0.3 to 7 g/cu m. The possible gas flow rate in wet type scrubbers is limited by the magnitude of the carry-away. To prevent the efficiency from decreasing considerably, neutralization or settling of the cycle water should be provided for.

25216 **APTIC NO. 46599**

Kropp, L. I. and A. I. Akbrut

WORKING PROCESSES IN AND COMPUTATION OF THE EFFICIENCY OF VENTURI ASH SEPARATORS. *(Rabochiye protsessy i raschet effektivnosti zoloulovitelya s truboy Venturi). Text in Russian. Teploenergetika, no. 7:63-68, 1972. 10 refs.*

Calculations of the efficiency of power plant wet type venturi ash separators are described. Such venturi tubes usually have cone angles of 40-60 deg and expansion angles of 8-9 deg, and the venturi separator is followed by centrifugal scrubbers for droplet separation. Flow speeds for various fractions of soot particles and droplets in venturi separators with different capacities were calculated. The differences in the fractional efficiencies are due to those in the speeds of fine and coarse fractions in the venturi. The efficiency of the venturi separator increased with the inertial settling coefficient relating to ash particles settling on water droplets, the specific water expenditure, and a velocity-related factor, and decreased with increasing droplet diameter. The probability coefficient of the inertial settling of ashes as generated in energetic equipment is approximately 1. Formula for the calculation of the over-all efficiency of combined wet type venturi ash separators and droplet separating scrubbers is given. The calculations by means of the formula are in very good agreement with the reality.

25217 **APTIC NO. 46877**

Lagutin, Yu. V. and V. V. Shul'ga

SOME EXPERIENCES WITH ELECTROSTATIC PRECIPITATORS. *(Iz opyta ekspluatatsii elektrofil'trov). Text in Russian. Tsement, no. 7:16-17, July 1972. 4 refs.*

Some experiences concerning the operation of electrostatic dust precipitators in cement works are described. The application presently of some 20 different precipitator designs is due to the lack of specific types designed for the needs of the cement industry. The unsatisfactory operation of most of the electrostatic precipitators is attributable to improper design or assembly, or to violations of the technological specifications. Gas intake ducts designed without respect to the aerodynamic characteristics of the gas flow may result in flow distribution among the individual sections being uneven. Corona discharge electrode mounting frames with large cross-section area hinder the uniform tightening of wires with frequent breaks during operation as a result. Knocking mechanisms made of regular steel grades are usually not durable. Increasing the temperature of the gas to be discharged to 350 C caused deformation of the electrostatic precipitator in one instance.

25218 **APTIC NO. 46629**

Lee, Max Nai Yuen and Richard Joseph Schoofs

PURIFICATION OF GASES CONTAINING ACID IMPURITIES BY ADSORPTION ON AN ACTIVATED ZEOLITE MOLECULAR SIEVE. *(Verfahren zur Reinigung von Gasen). Text in German. (Union Carbide Corp., New York) Ger. Pat. 1,911,670. 4p., April 6, 1972. (Appl. Oct. 9, 1969, 1 claim).*

Gases which contain carbon dioxide, carbonyl sulfide, nitrogen dioxide, hydrogen sulfide, carbon disulfide, sulfur dioxide, and 1-5 carbon alkyl mercaptans are passed through a layer of an activated crystalline zeolite molecular sieve. The pores of the sieve are large enough to adsorb ammonia and at least one of the acid impurities, with 0.1-10 wt% NH_3 being previously adsorbed on the sieve. Small quantities of molecular sieve are required.

25219 **APTIC NO. 46570**

Lengyel, Zoltan

FIGHT AGAINST DUST AND SMOKE - PART V. *(Kuzdelem a por es fust ellen V.). Text in Hungarian. Energia Atomtech. (Budapest), 25(7):336-339, 1972.*

Problems of the outdoor and indoor air pollution in Budapest are reviewed with special regard to architectural measures and ventilation techniques to be applied to abate indoor dust levels. The increasing use, by households and industries alike, of gas and oil as well as of central remote heating systems during the past years has failed to lead to a reduction of the air pollution in Budapest, which is due to heating equipment and vehicles being in bad repair, and to inefficient heating techniques. Adequate architectural measures, especially the use of tight doors and windows, and of separate air filters for the indoor air supply, represent the basic means of controlling the indoor air pollution due to dust. Such air filters can be made with metal shavings as filtration material at very low cost. Filters should be required for the smokestacks of central and remote heating systems. Ventilation, air conditioning, and sterilizing equipment, available for household and business in West Germany, England, France, and the U.S.A. are described.

25220 **APTIC NO. 46887**

Liu, T. C., H. S. Shen, and M. P. Lo

SUMMARIZED REPORT ON THE REMOVAL OF FLY-ASH USING WATER SPRAYING METHODS. *Taiwan Sugar, 19(4):127-130, July-Aug. 1972. Translated from Chinese by C. C. Chow.*

Water spray installment on flue gas ducts has proved effective in preventing air pollution from sugar mills burning gas or coal as fuel. Total water used is roughly equivalent to the grinding capacity of the mill. The duct must be long enough, otherwise an additional duct must be constructed to lengthen the flue gases to the chimney by passing through turns. Natural draft type boilers are not suitable for such an installment. Proper treatment of the dust or waste water is required to free the water from pollution. Experience from the four mills in which the water spray system was installed is summarized, and suggestions are made to aid in further design work for other mills. (Author conclusions modified)

25221 **APTIC NO. 46414**

Lommerzheim, Werner and Harry Hahn

BRIEF REPORT ABOUT NOX MEASUREMENTS IN COMBUSTION GASES. *(Kurzmitteilung ueber NOx-Messungen in Verbrennungsgasen). Text in German. Gas Wasserfach, Gas Erdgas (Munich), 113(8):397-399, Aug. 1972.*

Since 1967, emissions of nitrogen oxides from numerous industrial natural-gas-fired boilers and heaters in the supply area of the Thyssengas company in West Germany have been measured. For comparison, boilers fired with coal, various fuel oils, and coking gas were included in the measurements. The photometric phenol disulfonic acid (PDA) method was selected as the standard measuring method. The final PDA version corresponded to VDI guideline 2456, whose draft was published in May 1971. Parallel measurements with the photometric Saltzman method produced differences of less than + or 10%. The nitric oxide plus nitrogen dioxide reaction is only to a very limited extent dependent on the type of fuel. The temperature characteristics and the residence time of the combustion products (including excess air) in flames and in high temperature zones is decisive. Natural gas and coking gas yield better results compared with other fossil fuels, especially hard coal.

25222 **APTIC NO. 46571**

Lyabakhov, T. Ya.

GAS CLEANING BY ELECTROSTATIC PRECIPITATORS AFTER ROTARY ROASTERS FOR CONCENTRATES. *(Ochistka gazov elektrofil trami pri sushke kontsentratov v sushil nykh barabanakh). Text in Russian. Tsvetn. Metal., no. 6:24-27, 1972. 4 refs.*

Problems encountered in the use of dry electrostatic precipitators for cleaning waste gases from rotary roasters for pyrite, copper, and zinc concentrates are described. The bulk of the dust is in a fraction of 20-80 micron. Problems such as current leaks, ignition of the deposited dust and explosions during knocking made first the application of high voltage impossible, though the efficiency reached in settling chamber operation was fairly good. When high-voltage operation was resumed, efficiencies of 99.6-99.7% were reached, and current leaks, occurring especially with humid gases at temperatures below 100 C, were avoided by means of heated insulators. The ignition of the deposited dust was avoidable by maintaining the moisture content in the concentrate above 5-6%, and all fields of the electrostatic precipitator were deenergized for knocking to prevent explosions. Still, cyclones and wet type dust separators were superior to electrostatic precipitators regarding both reliability and economy, especially when the fraction below 10 micron, with a specific gravity of 4.0-4.6 g/cu cm accounts for not more than 10%.

25223 **APTIC NO. 46705**

Maksimov, V. F., O. I. Yakovleva, L. N. Grigoryev, L. M. Gonobilina, M. A. Petronio, V. F. Dzyuba, and V. V. Fomenko

SECONDARY VAPOR CONDENSATE PURIFICATION IN EVAPORATION PLANTS. *(Ochistka kondensata vtorichnogo para vyparnykh stantsiy). Text in Russian. Bumazhn. Prom. (Moscow), no. 8:8-10, 1972. 5 refs.*

Experiments were performed to determine the optimum conditions for the purification of the sulfate process secondary vapor condensate containing hydrogen sulfide, methyl mercaptan, and dimethyl disulfide. The purification of the secondary vapor condensate is done by means of air blow in a plate type apparatus from which the spent air containing sulfur compounds is sent to a Raschig ring scrubber for separation of the desorbed gases by chemisorption in the presence of diluted white liquor additive. The secondary vapor condensate to be treated should be at a temperature of 70-85 C, and a blow air expenditure of 23-40 N cu m/cu m of condensate should be applied. The pH value of the condensate should not exceed 7.5. The respective efficiencies for H2S and methyl mercaptan at a pH value of 7.3 were 90% and 88.3%. The necessary white liquor expenditure for the scrubbing of the spent air is 0.003 cu m/N cu m of air. A scrubber efficiency of 98-99% was reached.

25224 **APTIC NO. 46434**

Malov, R. V.

ABATING THE TOXICITY OF DIESEL ENGINE EXHAUST THROUGH INFLUENCING THE OPERATION CYCLE. *(Snichenlye toksichnosti dizel nogo vypuska vosdeystviyem na rabochiy protsess). Text in Russian. Avtomob. Prom., 38(7):5-6, 1972. 2 refs.*

Various possibilities to decrease the amounts of different toxic components in diesel engine exhaust emission are described. The recycling of 40-50% of the exhaust gas results in reduced nitrogen oxides emissions, mostly at high engine speeds when the unburned hydrocarbons decrease. The preliminary cooling of the combustion air from 120 C to 30 C accounts for a decrease by 20% in the nitrogen oxides content. An ignition advance angle increased to 12 deg led to a reduction of NOx emissions by 2.5 times and an increase by 100% in the soot content. Water spray, admitted into the feed pipe at a rate of 0.7-0.8 kg/kg of fuel caused the NOx emissions to decrease by 50% or more, and entailed reduction also in the power output. Oxygen excess is capable of reducing the exhaust soot content. The soot emissions decreased by 80%, while the aldehydes and the NOx increased (the latter by 10-15%) when fuel saturated with oxygen under a pressure of 3.5 atm over 65 hours was used. An increase of the excess-air coefficient from 1.17 to 1.65 accounted for a reduction by 2.3 times in the NOx soot emission.

25225 **APTIC NO. 46800**

Marchand, J. Le

DUST SEPARATING EQUIPMENT. RECENT DEVELOPMENTS. *(Les equipements de depoussierage. Evolution recente). Text in French. Tech. Moderne, 64(7-8):41-42, July-Aug. 1972.*

Recent developments and trends in the area of dust separators are reviewed. In view to the increasing trend toward the adoption of a dust emission standard of 150 mg/N cu m, multicyclones with relatively low efficiencies will be increasingly used as pre-stage separators, or will be replaced by other equipment such as high energy venturi scrubbers for very fine dust, bag filters, or electrostatic precipitators. Dust separating equipment with an absolute filter or an activated carbon filter, designed for a maximum dust concentration of 1 mg/cu m, as a last stage, should be connected in a series to reach very high efficiences as required for radioactive particles, beryllium oxide, or odorous dusts. Humidification of the dust being separated, the application of wet methods, and recycling of the captured dust are among the basic possibilities of preventing secondary nuisances with dust separation. The use of needle-punched Tergal, Nomex felt, and glass-fiber tissues for bag filters, of corrosion-resistant, easily replaceable component parts for scrubbers, and of rigid point electrodes in place of wire electrodes for electrostatic precipitators are measures susceptible of increasing the reliability and of facilitating the maintenance of such equipment. The use of pneumatic knocking for bag filters made it possible to reach considerable compactness of such units. Dust separating equipment serving multiple purpose such as Rotoclone N and W type wet scrubbers, and special dust separators designed for the specific needs of various industries (machine shops, foundries, steel melting furnaces, cement works, highway construction) are mentioned.

25226 **APTIC NO. 47051**

Meakin, John C.

FILTRATION WITH GLASS FIBER PAPER. *(Filtration mit Gasfaserpapier). Text in German. Allgem. Prakt. Chem. (Vienna), 23(7/8):187-188, 1972.*

Through the selection of a suitable fiber diameter, the filtering properties of glass fiber papers can be determined with great accuracy. Particles down to 0.5 micron can be efficiently filtered from water and even smaller particles from gases. The special advantage of glass fibers over other filtering devices is the combination of a high retention capacity for small particles with a high throughput speed and a high loading capacity. Other important properties of glass fiber filters are chemical thermal resistance and a constant weight. However, glass fiber filters are exceedingly more expensive than cellulose filters.

25227 **APTIC NO. 46931**

Milliken, C. L.

COPPER MELTING PLANTS OF THE SEVENTIES. *(Kupferschmelzanlagen der Siebziger Jahre). Text in German. Metall (Berlin), 26(11): 1105-1107, 1972. 5 refs.*

The conventional copper melting plants are in difficulty because of the increasingly stringent regulations concerning environmental pollution. The greatest problem these plants face is the reduction of the emission of sulfur dioxide. The number of experimental plants for the recovery of the SO2 in form of elemental sulfur from the waste gases is large. In some instances waste gas cleaning plants were attached to the copper melting plants, in some cases the melting process itself was modified. An example for the first method is the Onahama plant of the Mitsubishi Metal Mining Company. This plant uses stainless steel flues leading from the converter to a waste heat boiler for reducing the gas temperature. An electrostatic precipitator is followed by a Lurgi double catalyst sulfuric acid plant. The Outokumpu Oy plant in Finland uses flash melting with waste gases containing about 14 to 15% SO2. Through the higher SO2 concentration these gases can be more economically treated for sulfur recovery. The best melting process would combine the Outokumpu flash furnace with a stationary top-blasted converter. A flue, tightly connected to the converter, would lead to a heat exchanger and to the gas cleaning plant. The flue could be water cooled and designed so that it becomes part of the heat exchanger.

25228 **APTIC NO. 46555**

Moss, G.

SULPHUR REMOVAL DURING FLUIDISED BED COMBUSTION. *Birmingham Univ. Chem. Engr., 23(1):24-30, 1972. 2 refs.*

Sulfur was retained during the combustion of hydrocarbon fuels in fluidized beds of lime under both oxidizing and reducing conditions. A regeneration procedure yielded high concentrations of sulfur dioxide and a reactive bed material in both cases. Information is presented concerning the chemical reactions involved and the optimum operating conditions. The variation in reactivity between different stones is discussed as well as the loss in reactivity resulting from repeated use. The effect of particle size on reactivity is dealt with and it is shown that lime will retain vanadium as well as sulfur. (Author summary)

25229 **APTIC NO. 46415**

Mueller-Berner, A. H. and H. Hardenberg

WATER-COOLED MERCEDES-BENZ DIESEL MOTOR, SERIES 400. *(Wassergekuehlte Mercedes-Benz Dieselmotoren Baureihe 400). Text in German. Automobiltech. Z. (Stuttgart), 74(8):303-311, Aug. 1972. 17 refs. (Presented at VDI/ATG Conference on the Occasion of the 75th Anniversary of the Diesel Engine, Augsburg, West Germany, March 15-17, 1972.)*

The Mercedes-Benz diesel engines of the 400 series are equipped with a direct injection system. For creating a vortex, the inlet canal is a spiral. Combustion chamber geometry and air turbulence are carefully optimized. The exhaust gas emission of the direct injection engine was examined with the USA 21-step test and compared with the exhaust gas emissions of an engine with a chamber for preliminary combustion. The direct injection engine emitted about 72% more nitrogen dioxide than the engine with preliminary combustions. The latter engine, however, emitted 118% more carbon monoxide and 62% more hydrocarbons. With the direct injection engine the NO2 + HC sum value is almost independent of the load. It increases slightly with dropping load. With another engine of the new series (the six-cylinder OM 407) the 13-mode California-cycle was performed in dependence of the injection beginning. The emission of NO2 + HC amounted to about 8 g/hp hr at normal injection, the CO emission to 4 to 5 g/hp-hr. Another engine of the series 400, the M 407 hG, is operated with natural gas. This has the advantage that no smoke is emitted. Tests according to the 13-mode California-cycle revealed that the CO emission is even lower than with the series diesel engine, the same is true for the sum value NO2 plus HC.

25230 **APTIC NO. 46436**

Mukhlenov, I. P., S. A. Ikramov, N. P. Matveyeva, and V. I. Deryuzhkina

THE EFFECT OF ALKALI METAL SALTS ON THE PROPERTIES OF SULFUR DIOXIDE OXIDIZING VANADIUM CATALYSTS. *(Vliyaniye soley shchelochnykh metallov na svoystva vanadiyevykh katalizatorov okisleniya sernistogo gaza). Text in Russian. Zh. Prikl. Khim., 45(6):1341-1344, June 1972. 7 refs.*

The effects of alkali metal salts (lithium, sodium, potassium, rubidium, and cesium) on the composition, structure, and activity of sulfur dioxide oxidizing, wear-resistant vanadium catalyst on aluminosilicate basis were studied. Spherical granules of the support material were impregnated with a solution of the alkali metal salt (120 g/l) and of potassium metavanadate over 2 hours, followed by heat treatment at 650 C over 2 more hours. The different promoters had specific effects on the porous structure of the catalyst. Fairly monodisperse structure (equivalent radii of 1000-1200 Angstrom) were obtained with lithium, sodium, and potassium, and cesium additive resulted in polydisperse structure. Catalytic experiments with 7% of the SO2 revealed the highest activity for catalysts containing small amounts of cesium (70% efficiency at 560 C). Whereas the vanadium pentoxide content increased with the atomic number of the alkali metal salts, the individual effects of the latter on the structure of the aluminosilicate across V205 resulted in complicated relationships between the specific surface and the atomic number. The specific surface was smallest for cesium, and nearly identical for lithium, sodium, and potassium.

25231 **APTIC NO. 46869**

Oeser, P., D. H. Pundt, and W. Buttergeit

ENGINE TESTING OF CATALYSTS - CONVERSION VERSUS INLET CONDITIONS. *SAE (Soc. Automot. Engrs.) Spec. Pub., no. 370:1-12, May 1972. (Presented at the National Automobile Engineering Meeting, Detroit, Mich., May 22-26, 1972, Paper 720482.)*

A test procedure to determine the conversion performance of oxidation and reduction catalysts for the treatment of automotive engine exhaust gases is described. The variable parameters are the air/fuel ratio, the secondary air quantity, and the space velocity. The results are recorded in diagrams which permit the selection of optimal catalysts with reference to the conversion and which also form the basis for the layout of the necessary devices for controlling air/fuel ratio and secondary air. Characteristic results with noble metal catalysts on monolithic supports and pelleted base metal catalysts are shown. (Author abstract modified)

25232 **APTIC NO. 46552**

Okuno, Tomofumi

THE SHINKO-TYPE POLYMER INCINERATOR BASED ON THE IDEAS OF THE OSAKA PREFECTURAL INDUSTRIAL PROMOTION ASSOCIATION. *(Taikosho koso ni motozuku Shinko-shiki kobunshi senshoro). Text in Japanese. Kogai Boshi Sangyo (Environ. Pollution Control), 2(7):81-85, July 1972.*

The system described comprises a furnace made of a primary incinerator, a secondary incinerator, a heat saver, and cyclone scrubbers, and the entire system is compactly assembled for the purposes of incineration, dust collection, and absorption of toxic gas. The primary combustion room is cylindrical and has a supplementary burner and an air curtain formed by an air pusher. The air curtain also circulates the combustion gas and increases the speed of combustion, which is achieved at about 950 C. Incompletely burned gas moves onto the heat saver and then to the secondary combustion room, which has a recombustion burner. The combustion gas then goes through a venturi and is lead to the main cyclone. Part of the waste gas is returned to the second cyclone after which it is emitted from the stack. A liquid tank and a pump are installed under the cyclones, and the liquid is circulated after it is used for the showers at the entrance and in the main and the secondary cyclones. Here, toxic gases and dusts are absorbed and a mist separator in the second cyclone prevents water from spraying outside. White smoke is prevented by use of the residual heat of the furnace. Hydrochloric gas is absorbed by caustic soda solution in the cyclone scrubbers.

25233 **APTIC NO. 46433**

Otvagina, M. I. and N. S. Sretenskaya

RECOVERY OF ELEMENTARY SULFUR FROM SO2-CONTAINING WASTE GASES AND FROM PYRITE. *(Polucheniye elementarnoy sery is otkhodyashchikh SO2-soderzhashchikh gazov i pirita). Text in Russian. Tsvetn. Metal., no. 6:23-24, 1972. 17 refs.*

Methods for the recovery of sulfur from waste gases from nonferrous metallurgical processes, containing 30-70% of sulfur dioxide, and from pyrite are described. The catalytic reduction of SO2 in the presence of hydrocarbons represents the basic method for the recovery of elementary sulfur. Natural gas as a reducing agent and an active aluminum oxide catalyst with vanadium pentoxide plus sodium oxide as promoters were the best for the conversion at 700 C in laboratory tests. Two different technological variants of the reduction process were elaborated for waste gases containing 60% of SO2, 35% nitrogen, and 5% oxygen. One variant uses SO2 and methane in a ratio of 1.6 at 700 C temperature to obtain elementary sulfur, hydrogen sulfide, and carbon dioxide. The H2S formed in the first stage of the catalytic reactor is converted into elementary sulfur in a stage in the presence of additional SO2. The residual SO2 and H2S content in the waste gas are 1.5% and 1%, maximum. The sulfur content in the waste gas can be utilized for sulfuric acid production. The second variant applies methane in excess to obtain H2S, CO2, and water, which are then further processed catalytically in the same manner as in the first variant. A two-stage fluidized bed process developed for the recovery of elementary sulfur from pyrite comprises such stages as the thermal distillation and partial reduction of SO2 by means of iron sulfate at about 700 C temperature, and the formation of SO2 by roasting the iron sulfate. The rate of sulfur reduction is about 40%, and a SO2 concentration of 90% or higher can be reached by applying an oxygen blast. The waste gas rich in SO2 is then processed by means of methane.

25234 **APTIC NO. 46560**

Petrushov, V. P., G. M. Gordon, and D. F. Aptekar

MEASURES APPLIED TO REDUCE THE AGGRESSIVITY OF WASTE GASES AND TO IMPROVE THE WORKING CONDITIONS FOR BAG FILTER TISSUES. *(O merakh po snizheniyu agressivnosti gazov i uluchsheniyu usloviy raboty tkani rukavnykh fil trov). Text in Russian. Tsvetn. Metal., no. 7:29-31, July 1972.*

Measures applied to reduce the aggressivity of the waste gases and to improve the working conditions for the bag filters at a copper melting plant processing dusts with high sulfur content and ashes from thermal power plants are described. The waste gases to be treated contained up to 3.5% of sulfur dioxide and up to 0.2% of sulfur trioxide. To reduce the aggressivity of the waste gases, powdered lime was added into the charge at a rate of 3-4%, or to the waste gas in an emergency as soon as the SO2 content exceeded 0.4 g/N cu m. Sulfur trioxide is neutralized by means of partly oxidized residues from the separating chamber and cyclones before the bag filter, which are added to the dust charge at a rate of 10%. The replacement of mazout by diesel fuel resulted in a decrease in the SO2 content to 0.08 0.15 g/N cu m. Flannelette filters were replaced by Nitron fiber filters to reach operating temperatures of 135-140 C and a filter resistance of 8-120 mm water column. Dedusting is done by periodic knocking with air counterflow at 80-100 C temperature. As a result of the above measures, the bag filter efficiency was above 99%, and the waste gases entering the bag filter contained 0.28-0.7 g of SO2 and 0.0056-0.0112 g of SO3/cu m. The raw gas composition was automatically controlled by variation of the charge temperature, was neutralized with powdered lime, and had increased air intake. It was thus possible to increase the life of the tissue filter to 11.5-12 months.

25235 **APTIC NO. 46620**

Pitts, Frank

ZIRCONIUM DIOXIDE ADSORBENT FOR SULFUR DIOXIDE. *(Verfahren zur Entfernung von Schwefeloxyden aus einem Gas). Text in German. (Magnesium Elektron Ltd., Manchester (England)) Ger. Pat. 2,133,451. 10p., Feb. 24, 1972. (Appl. July 6, 1971, 10 claims).*

An adsorbent with a specific surface area of 12.2-60 sq m/g is described for the removal of sulfur dioxide from flue gases at

150-330 C. A zirconium-sodium hydroxide mixture was heated at 650 C and calcined at 450-850 C to produce an adsorbent containing 73-76% zirconium dioxide, 6.6-11.7% sodium monoxide, 5.9-6.9% silicon dioxide, and 2.9-11.0% zirconium. The adsorbent can be regenerated by treatment with a nitrogen stream at 550 C.

25236 **APTIC NO. 46884**

Pollone, Carlo

FIAT STATUS REPORT ON LOW EMISSION CONCEPT VEHICLES. *SAE (Soc. Automot. Engrs.) Spec. Pub., no. 370:1-16, May 1972. (Presented at the National Automobile Engineering Meeting, Detroit, Mich., May 22-26, 1972, Paper 720485.)*

Work done by Fiat during the last year, in participation with the Inter-Industry Emission Control Program, has included the development of low emission concept cars, in an attempt to meet the IIEC low mileage engineering targets. One concept which was considered included a thermal reactor, oxidizing hydrocarbon/carbon monoxide converter, and exhaust gas recirculation, while the other concept comprised oxides of nitrogen and HC/CO catalytic converters. To support the development of the components of these systems, laboratory procedures were established for the screening of materials for thermal reactors and of oxidizing catalysts. A search for low-cost materials for thermal reactors was also conducted. The lowest emissions were obtained with a system including two noble metal catalytic converters for NOx and HC/CO, respectively. (Author summary modified)

25237 **APTIC NO. 46801**

Resplandy, A.

ATMOSPHERIC POLLUTION BY SULFUR DERIVATIVES EMITTED DURING PULP-MAKING. III. SULFITE AND NEUTRAL SULFITE PROCESSES. *(Pollution atmospherique par les derives du soufre emis au cours de la fabrication des pates. III. Procedes aux bisulfites et aux sulfites neutres). Text in French. ATIP, 26(4):253-277, 1972. 134 refs.*

Various stages of the bisulfite and neutral sulfite processes are scrutinized with regard to emissions of sulfur derivatives. The bisulfite pulp process is responsible, under normal conditions, for minor amounts of sulfur dioxide emissions, while the neutral sulfite processes produce no sulfurous emissions. The condensing of bisulfite liquor residues is responsible for small SO_2 emissions, but neutral sulfite liquor residues emit no sulfur derivatives during concentration. There is no technically acceptable solution to the incineration of calcium bisulfite liquor residues due to the intolerable SO_2 and dust emissions, and also problems caused by SO_2 emissions from the incineration of bisulfite and neutral ammonium sulfite liquor residues remain to be solved. The use of magnesium liquors represents the only solution permitting the integral recycling of the pulping chemicals involved without producing malodorous sulfur derivatives, and only minimum amount of SO_2 emission. Among processes for the recovery of pulping chemicals from sodium bisulfite and netural sodium bisulfite liquor residues in conventional waste-heat boilers, the Tampella process, developed in Finland, is superior to other processes, notwithstanding it generates considerable hydrogen sulfide emissions. Pyrolytic techniques for the recovery of pulping chemicals from residual liquors, where the SO_2 present in the burned gases is sorbed on solid or liquid products of pyrolysis are most suitable for pulp-making plants of medium capacity. However, accidental H_2S emissions are a possibility in such pyrolytic techniques. Fluidized-bed processes generate no H_2S, and the SO_2 emissions can be easily minimized.

25238 **APTIC NO. 46449**

Riedel, E.

LOW-MAINTENANCE, HIGH-CAPACITY FILTERS WITH PNEUMATIC CLEANING FOR THE CEMENT INDUSTRY. *(Wartungsarme Hochleistungsfilter fuer die Zementindustrie mit pneumatischer Reinigung). Text in German. Zement-Kalk-Gips (Wiesbaden), 25(9):453-455, 1972. 3 refs.*

Although pneumatic cleaning of tubular or envelope-type cloth filters by pneumatic pressure waves in intervals of 30 to 90 seconds is more than 15 years old, it is hardly ever used in the European cement industry. The pneumatic cleaning method has made the use of synthetic-fiber-felts feasible. The dust is allowed to penetrate deep into the felt where it is easily removed by the intense pneumatic cleaning process. Collection efficiencies of 99.98% can be achieved. The filter can be loaded with 6.5 cu m/sq m/min. The operating time of the filters is extremely long. The pressure loss is only 80 to 150 mm water. The filter elements can be quickly exchanged. The collection process of the dust particles by the force of inertia, the sifting effect, and the overlapping and electrostatic diffusion effects which affect particles of less than one micron are reviewed. The costs for this type of dust cleaning system installed at drilling units, aspirators, and clinker coolers are graphically illustrated. They compare favorably with other cleaning systems.

25239 **APTIC NO. 47008**

Rusanov, A. A.

THE GENERAL ASPECTS OF THE DESIGN AND OPERATION OF GAS PURIFICATION SYSTEMS. *In: American Institute of Crop Ecology Survey of USSR Air Pollution Literature. Some Basic Properties of Ash and Industrial Dust in Relation to the Problem of Purification of Stack Gases. M. Y. Nuttonson (ed.), Vol. 16, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 1-31. Translated from Russian. (Also: Energiya, 1969:5-38, 1969.)*

The basic parameters to be considered in the design and operation of gas purification systems are examined, including the basic properties of ash and industrial dust; parameters of gases undergoing purification; discharge, density, and ash or dust concentration of flue gases; chemical processes occurring in dust collectors; and coefficients of purification of gases in dust and ash collectors. The most important characteristics of ash or dust are adhesiveness, density, abrasiveness, dispersity, chemical composition, and electrical resistivity. Mathematical formulae are presented for determining parameters of gas moisture and dust content and density, excess air coefficient, volume of combustion products, gas flow rate, and other operating parameters. The chemical processes of absorption of carbon monoxide, carbon dioxide, sulfur dioxide, and sulfur trioxide in scrubbers are also examined.

25240 **APTIC NO. 46611**

Sakuma, Masaru, Hiroshi Takiguchi, Koichi Ito, Yojin Inoue, and Zennosuke Ogawa

INORGANIC FIBER FILTER CLOTH. *(Mukishitsu senisei firuta kurosu). Text in Japanese. (Asahi Fiber Glass Co. (Japan) and Shinetsu Chemical Industries Co. Ltd. (Japan)) Japan. Pat. Sho 47-38505. 6p., Sept. 28, 1972. (Appl. Dec. 19, 1969, 2 claims).*

This invention is designed to produce superior refractory inorganic fiber filter cloth. An inorganic fiber cloth is treated with an organopolysiloxan containing fluorine and at least one mol % of siloxy unit and in a second claim, also with methyl fenyl polysiloxan. In an atmosphere with a temperature higher than 300 C the cloth shows an excellent durability, dust collection rate, filter resistance, wear resistance, tear strength, and reduced shrinkage.

25241 **APTIC NO. 47095**

Schmidt, Alfred

THE INDUSTRIAL USE OF THE FLUORINE CONCENTRATION OF THE RAW PHOSPHATE. *(Die indus-*

trielle Nutzung des Fluor-Gehaltes der Rohphosphate). Text in German. Chem. Ing.-Tech., 44(19):1093- 1099, Oct. 1972. 10 refs.

The rapidly increasing demand of fluorine as a raw material has made the utilization of a hexafluoro-silicic acid, which is obtained at the production of phosphate fertilizer, necessary. The recovery of the hexafluoro-silicic acid from the waste gases or vapors is simple. The waste gas, cleaned by various types of scrubbers, must contain silicium tetrafluoride which liberates part of the silicic acid upon absorption in water. The separated silicic acid tends to incrustate the scrubber. For best results therefore centrifugal or venturi scrubbers are used. The recovery of the fluorine from the vapors of the phosphoric acid concentration is somewhat more difficult, since the evaporators operate with a vacuum. In this case empty scrubbers are used into which the scrubbing fluid is injected by several nozzles. In both cases a 20 to 25% hexafluoro silicic acid solution can be obtained. The methods of production of calcium fluoride, aluminum fluoride, and cryolite, as well as hydrogen fluoride, from hexafluoro-silicic acid are described.

25242 **APTIC NO. 46442**

Scholze, S.

STUDIES OF THE COMBUSTION PROMOTING EFFECTS OF FUEL OIL ADDITIVES. *(Untersuchung der verbrennungsfoerdernden Wirkung von Heizoelzusaetzen). Text in German. Freiberger Faschungsh. A, no. 507:25-46, 1972. 10 refs.*

In fuel-oil-fired furnaces the use of combustion promoting additives is one possibility, apart from constructional and operational measures, for the achievement of complete combustion. However, additives should be used solely if all other measures failed. The combustion promoting effect of additives is based on the promotion of the oxygen transfer from the primary air to the fuel and on a reduction of the surface tension of the fuel oil. The surface tension of fuel oils (with and without additive) was examined, and the viscosity measured. The additives, added in quantities ranging from 0.5 to 3%, lowered the surface tension only slightly. By addition of 3% additive, the surface tension dropped by a maximum of 2.4 dyn/cm. The same result can be achieved at a much lower cost by warming up the oils. This reduces the viscosity simultaneously which permits a better dilution and a better combustion. For the determination of the effect of additives, only costly and time consuming test combustion channels are available, so a simple combustion lamp was developed for the tests. It had the great disadvantage that only n-heptane-soluble additives with components which are thermally stable to 700 C can be tested.

25243 **APTIC NO. 46421**

Seifert, F.

CAR WRECKS ARE SMASHED TO FEAST-SIZE PIECES. *(Autowracks werden zu faustgrossen Stuecken zertruemmert). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 26(33):6, Aug. 1972.*

Since 1970, the Federal Republic of Germany has 25 large shredders which produce about 20,000 t/mo of scrap. These are not exclusively car shredders but take refrigerators, washers, and kitchen ranges as well. Recently a car shredder began operation in Ebenhausen near Ingolstadt (West Germany) far away from residential areas for avoidance of any noise and dust exposure of residents. Prior to shredding the car engine, the tires and seats are removed. A conveyor belt supplies the car bodies to the shredder, which comprises numerous hammers (each weighing 150 kg) smashing the cars into palm-sized scrap pieces. They are sorted in two magnetic drums. The dust which develops at the shredding operation is drawn off, collected, and dumped. The steel scrap is delivered to steel plants. The shredder has the capacity of demolishing 150,000 cars per year.

25244 **APTIC NO. 46621**

Shah, Indravadan Shantilai

HYDRATED MAGNESIUM SULFITE-MAGNESIUM OXIDE CONVERSION. *(Verfahren zur Umwandlung von festem Hydratisiertem Magnesiumsulfit zu Magnesiumoxid). Text in German. (Chemical Construction Corp., New York) Ger. Pat. 2,128,240. 16p., Jan. 27, 1972. (Appl. June 7, 1971, 11 claims).*

Magnesium sulfite formed when washing waste gases with magnesium oxide can be converted to MgO and sulfur dioxide without formation of magnesium sulfate and sulfur trioxide. The wet $MgSO_3.6H_2O$ is dried and dehydrated in a nonoxidizing atmosphere at 300-700 C. A mixture of the product with 2-5% coke is calcined in the presence of carbon monoxide and oxygen at 750-1300 C by fuel oil combustion with air to give the regenerated MgO and an SO_2-rich gas.

25245 **APTIC NO. 46609**

Shinobiashi, Yoshimi

FILTER ADHESIVE METHOD FOR AIR FILTERS. *(Kuki rokaki ni okeru rokatai no secchakuho). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-37871. 2p., Sept. 25, 1972. (Appl. May 2, 1970, 1 claim).*

A special method of adhesion is described for preventing leakage of air at the joint of the filter on air filter equipment. Both ends of the filter material are presoaked in an adhesive solution and hardened. The ends of the filter material lose their porosity. This filter is then inserted into the frame groove which is filled with adhesive solution.

25246 **APTIC NO. 47064**

Sonnenschein, Hans

NOVEL METHOD OF PRODUCING FURNACE BLAST. *(Neuartige Hochofenwind-Erzeugung). Text in German. VDI (Ver. Deut. Ingr.) Z. (Duesseldorf), 114(16):1185-1189, Nov. 1972. 6 refs.*

Furnace blast is generally produced in two steps, blast pressurization and heating. In the first step a considerable amount of waste heat is lost with the hot waste gases. Only between 24 and 32% of the heat used for pressurization remains actively in the cycle. These losses in the form of waste heat which pollute the atmosphere can be avoided by operating the turbine with air instead of steam or flue gases. The pure hot pressurized air which leaves the turbine is used as the furnace blast. The two-step process has become a one-step process. The required equipment and loss of hot waste air is accordingly lower. An indirect continuous heat transfer from hot flue gas to pure compressed air by circulating ceramic heat storers is necessary since the furnace blast must still be rich in oxygen and may not be polluted by combustion residues. For lower blast pressure, the air drawn in by the condenser is highly compressed and heated to the turbine entrance temperature by ceramic heat storers. In the turbine the air is depressurized to the level of the furnace pressure. The air is heated to the final temperature by the same heat storers. The hot flue gas heats the ceramic storers. For higher blast pressures the condenser and the turbine must be dimensioned for an air throughput which is slightly higher than the required furnace blast throughput. This larger hot air quantity is depressurized to the pressure level required for the blast furnace. The air flow is divided into the main flow going to the blast furnace and the secondary flow driving a supplementary turbine which provides for the missing energy.

25247 **APTIC NO. 46983**

Spencer, John D. and Bill Linville

BUREAU OF MINES ENERGY PROGRAM, 1971. *Bureau of Mines Information Circ., no. 8551, p. 1-2, 5-9, 19-29, 1972.*

Clean energy production from coal, oil, and gas, and the development of these and other energy sources continued to be a major objective of the energy research program of the Bureau of Mines during 1971. Increased emphasis was placed on the production of fluid fuels and chemicals from coal. Advances were achieved in the development of the Sythane and Hydrane gasification processes for producing pipeline gas from coal. Progress was made in research on solid wastes utilization, and on liquid fuels production from coal. Powerplant fly ash utilization is mentioned, as well as pyrolysis techniques, liquefaction with carbon monoxide and steam, gasification, and incineration of organic wastes. Sodium hydroxide treatment, classification-electrostatic separation, and froth flotation are being studied for removing the sulfur from coal before utilization. Sulfur dioxide removal from stack gas by reaction with ammonia, mineral waste absorbents, copper oxide-alumina, and a citrate process is considered. Methods for stack gas sampling and analysis are being developed. Electric power generation from coal is discussed. Coke and char from coal carbonization are mentioned. (Bibliography is Aptic 46987)

25248 **APTIC NO. 46984**

Spencer, John D. and Bill Linville

BUREAU OF MINES ENERGY PROGRAM, 1971. *Bureau of Mines Information Circ., no. 8551, p. 35-39, 1972.*

Investigations concerning gasification waste control, methanation, producer gas, hydrogen from coal dehydrogenation, hydrodesulfurization, catalytic hydrogenation, hydrogenation with carbon monoxide and water, and reductive alkylation are described. (Bibliography is Aptic 46987.)

25249 **APTIC NO. 46617**

Stolfa, Frank and Laurence Oliver Stine

DESULFURIZATION AND CRACKING OF HYDROCARBONS BY FIVE STAGE SEPARATION PROCESS. *(Verfahren zur Umwandlung und Entschwefelung eines Kohlenwasserstoffeinsatzmaterials). Text in German. (Universal Oil Products Co., Des Plaines, Ill.) Ger. Pat. 1,954,004. 10p., April 20, 1972. (Appl. June 18, 1970, 7 claims).*

Hydrocarbon materials with a sulfur content between 2 and 10% and a boiling point greater than 566 C can be cracked and desulfurized. The initial material is heated to 260-413 C in a catalytic reaction zone with hydrogen, then passed to a separation zone to give a gaseous and a liquid phase. The gaseous phase is passed to a second separation zone at a reduced temperature to give a second gaseous and liquid phase. A part of the gaseous phase is recycled, while part of the liquid phase is passed to a third separation zone to give a third gaseous and liquid phase. Part of the third liquid phase is catalytically, thermally cracked and the cracked product is separated in a fourth zone. The fourth liquid phase is separated at low pressure into a fifth liquid phase and an asphalt portion.

25250 **APTIC NO. 46992**

Strauch, Dieter

MASS STOCK KEEPING AND ITS INFLUENCE ON REFUSE REMOVAL. *(Massentierhaltung und ihre Einwirkung auf die Muell- und Abfallbeseitigung). Text in German. Staedtehygiene (Uelzen/Hamburg), 10:227-229, Oct. 1972. (Presented at the Institutes fuer Siedlungswasserbau, Muelltechnischen Kolloquium, 22nd, Stuttgart, West Germany, March 3, 1972.)*

Emissions resulting from large animal farms can be avoided by applying different methods. Masking and decomposing agents are sprayed into the stable or added to the air by means of a vaporizer. However, these agents are not very effective in mechanically aerated stables with a high throughput of air. Furthermore, the consequences of the application of chemical agents with regard to the health of the animals and the consumer have not yet been investigated. Technical methods to avoid emissions from animal farms are the application of ozone, biological filters, the washing of the air, and the combustion of waste air. However, all these methods are too expensive to pay. Most emissions, however, can be avoided by keeping the stables perfectly clean, by mechanical cooling of the dung pits, and the covering of all bad odors.

25251 **APTIC NO. 46553**

Takeshita, Masaaki

AIR CLEANING AGENT. *(Kuki jokazai). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-38306. 2p., Sept. 27, 1972. (App. Jan. 23, 1969, 1 claim).*

A new air cleaner (deodorant) appropriate for use in a living room, bathroom, refrigerator, or automobile, and capable of long, continued activity is described. Paraformaldehyde is mixed with a polyalkylene oxide compound of relatively high molecular weight and with small hygroscopicity. As an example, 50 portions of polyethylene glycol with an average molecular weight 6000 and 10 portions of paraformaldehyde are thoroughly mixed at 70 C. When it is heated, one portion of phthalocyanine blue powder is added and stirred well. The mixture is adsorbed on some fiber material of about 50 g weight, and used in an airwick fashion.

25252 **APTIC NO. 46622**

Tamura, Zensuke, Yuko Hishinuma, and Norio Arashi

DESULFURIZING WASTE GASES USING ACTIVATED CARBON. *(Verfahren und Vorrichtung zur Entschwefelung von Abgasen). Text in German. (Hitachi Ltd., Tokyo (Japan)) Ger. Pat. 2,137,847. 12p., Feb. 10, 1972. (Appl. July 28, 1971, 5 claims).*

A desulfurization procedure is described in which a part of the main stream of waste gas is diverted into a side system and washed with dilute sulfuric acid obtained as wash water from the activated carbon adsorption towers of the main unit. The cooled diverted stream is united with the main stream to adjust the temperature to an optimal value for adsorption of the sulfur dioxide. Several towers packed with the adsorbent, a main pipeline for conveyance of the gases from the source into the towers, a divergent pipeline, and means for washing the activated carbon with water to remove the adsorbed sulfur dioxide are required, in addition to means for concentration of the diluted H_2SO_4 by heat exchange with the diverted gas stream, and a conduit for conveyance of the cooled gas back into the main stream.

25253 **APTIC NO. 46878**

Tanaka, K., M. Akutagawa, K. Ito, Y. Higashi, and K. Kobayashi

TOYO KOGYO STATUS REPORT ON LOW EMISSION CONCEPT VEHICLES. *SAE (Soc. Automot. Engrs.) Spec. Pub., no. 370:1-24, 1972. 14 refs. (Presented at the National Automobile Engineering Meeting, Detroit, Mich., May 22-26, 1972, Paper 720486.)*

The extensive effort and progress made by the Toyo Kogyo Company in developing emission control systems applicable to small vehicles with small displacement reciprocating engines are described. Three concept emission package systems were selected as showing promise to achieve the very stringent targets established by the Inter-Industry Emission Control Program. These packages have been under evaluation for emission performance and durability in the total vehicle systems, which were experimentally built. These concepts incorporate component systems such as thermal reactors, exhaust gas recirculation, air/fuel ratio, catalytic converters, and other subcomponents to assist these main component systems. Despite the effort made to date, none of these package systems has reached the stage of satisfying the hydrocarbon/carbon monoxide targets over extended vehicle mileage, or the oxides of nitrogen target, even at zero vehicle miles. The durability of these package systems has been revealed as unsatisfactory, with frequent maintenance operations being required. (Author abstract modified)

25254 **APTIC NO. 46678**

Teverovskaya, B. Z., Yu. I. Rozengart, G. F. Yurchenko, P. I. Shestak, and I. D. Konev

EXPERIMENTAL TISSUE FILTER FOR CLEANING OPEN-HEARTH FURNACE WASTE GASES BEFORE WASTE-HEAT BOILERS. *(Opytnyy tkanevyy fil tr dlya ochistki martenovskikh gazov pered kotlom-utilizatorom). Text in Russian. Stal, no. 6:566-568, 1972. 5 refs.*

Experiences gained during the employment of experimental glass, silica, and quartz fiber tissue filters for cleaning oxygen-blast open-hearth waste gases before a waste-heat boiler are presented. The waste gases, of a temperature of 500-600 C, contain up to 40 g of fine dust/cu m, 70-90% of which is in a fraction below 0.5 micron. The bag filter was designed for a throughput capacity of 1000 cu m/hr, and has a resistance of 150 mm water column, maximum, at a flow rate of 0.2-0.25 m/sec. The residual dust concentrations are below 100 mg/cu m in all regimes of the open-hearth furnace. Dust removal is done by means of compressed air blown between the filter bags under a pressure of 3-4 atm without interruption in the filter operation. The waste gas and air temperatures, and the hydraulic resistance of the bag filter are controlled automatically, and the gas flow is maintained at constant value. Such tissue filters can be equally used for gas cleaning after waste-heat boilers, as well as for other waste gases, e.g., from chemical processes, with temperatures up to 400 C.

25255 **APTIC NO. 46699**

Turmezei, Odon

STACKS FOR GASEOUS AND LIQUID FUEL FIRING EQUIPMENT. *(Gazkemenyek). Text in Hungarian. Energiagazdalkodas, 13(7):319-324, July 1972.*

Problems of the design of stacks for gaseous and liquid fuel firing equipment in the industry are reviewed with regard to the specific conditions of such firings (intermittent load, large fluctuations, high water vapor content, condensation, corrosion, and explosion hazards) are reviewed. As the draught required for such stacks is low, stacks with reduced height are acceptable. Mortar is attacked by carbon dioxide in the presence of water vapor. The presence of sulfur dioxide or trioxide in the flue gases lead to the formation of sulfuric acid which condensates at about 148 C. Increased flue gas flow rates result in reduced corrosion hazards. Condensation occurs mainly at the top end and in the corners of stacks. The design of stacks involves the determination of the stack diameter and of the cooling conditions with regard to condensation processes on the basis of parameter mean values.

25256 **APTIC NO. 46623**

Uffelmann, Rolf

REDUCING DESORPTION OF SULFURIC ACID IN COKE SORBENT REGENERATION. *(Verfahren zur reduzierenden Desorption von auf nicht basischen Festoffen sorbierten Schwefelverbindungen). Text in German. (Battelle Development Corp., Columbus, Ohio) Ger. Pat. 1,945,090. 14p., Feb. 10, 1972. (Appl. Sept. 5, 1969, 7 claims).*

Sulfuric acid formed in the removal of sulfur dioxide from flue gas on a traveling coke layer was reduced to SO_2 and desorbed by contacting the sorbent with hydrogen sulfide at the adsorption temperature (approximately 140-160 C). The H_2S was supplied to the sorbent at an $H_2S:H_2SO_4$ molar ratio less than or equal to 1:3.

25257 **APTIC NO. 46977**

Vaillant, A. and H. W. Bodlaender

DEVELOPMENT OF LARGE SIZE ROTARY KILN COKE CALCINING UNITS WITH INCINERATOR. *(Die Entwicklung von grossen Drehrohroefen mit Nachbrennern zum Kalzinieren von Koks). Text in German. Aufbereitungs-Technik, 13(10):631-638, 1972. 12 refs.*

The worldwide requirement for calcined petroleum increased 145% over the last 10 years. Green coke is the raw material for this calcined petroleum coke, and is a by-product of the crude oil refining process which yields approximately 1.5% green coke. Heating of this green coke up to 1430 C releases volatile gases and changes the structure from a non-conductor to a conductor of high purity. Two types of calcining installations are described. The distribution of operating costs for the rotary kiln is shown. Stricter pollution regulations in the U. S. have led to the development of several types of installations to keep the emission within the codes limits. Installations with preheater, waste heat boiler, and scalp incinerator are shown schematically, and their relative cost and performance data are tabulated. One control method is the use of a pyrosettler in which particles burn and settle simultaneously. In the pyrosettler, the normal equation showing the relationship between the height of a gravity settling chamber and the settling velocities of the particles cannot be used when burning and settling take place simultaneously. Separate consideration of burning from settling can lead to serious errors in the design of such chambers, due to the Window Effect. A computerized mathematical model can be used to size new chambers, evaluate existing ones, and determine the emission by tracing the particles. Computerized mathematical models for the sizing and investigation of rotary kiln calciners are also briefly described considering the heat transfer and evolution of gases. The sizing of a coke calcining installation for a x capacity of 1100 tons/day with a computerized model is in progress.

25258 **APTIC NO. 47030**

Venezia, Ronald Anthony

THE IMPACT OF TRANSPORTATION ALTERNATES ON AMBIENT AIR QUALITY. *Washington Univ., St. Louis, Mo., Sever Inst. of Tech., Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., Jan. 1972, 162p. 52 refs.*

A model was developed to evaluate the impact of transportation alternates on ambient air quality through the unique use of data and techniques currently avaliable. The model predicts maximum pollutant concentrations of chemically stable pollutants that can be expected to occur more than once a year. Planning and political consideration of regional solutions to the related mass transit air pollution problem are discussed. Part of the proposed mass transit system for the St. Louis metropolitan region was used to test the model. Carbon monoxide and hydrocarbon concentrations were estimated for 1969 for evaluation of the methodology and for 1990 to determine the air quality impact of the transit system. In the St. Louis region, the proposed mass transit system would have a negligible air quality impact, with automotive emissions decreased by 1990 to levels well below the air quality standard. Hydrocarbon emissions, however, would exceed the standard due to high background levels and automotive emissions, individually and totally. Land use planning, transportation planning, and air quality are related on a regional basis and must be undertaken simultaneously for optimum individual and community satisfaction. (Author abstract modified)

25259 **APTIC NO. 46395**

Vick, Erhard

FROM THE VIEWPOINT OF THE MANUFACTURER: WASTE AIR CLEANING PLANTS. *(Aus der Sicht des Anlagenbauers: Abluftreinigungsanlagen). Text in German. Wasser Luft Betrieb, 16(9):279-282, 1972.*

After a brief review of the pros and cons of thermal and catalytic afterburners, the former are discussed from the viewpoint of the manufacturer. Thermal afterburners are more universally useable and are more robust than catalytic afterburners. The manufacture of combustion chambers for thermal afterburning with a cleaning efficiency of 99.5% poses no more problems nowadays. The points of concern for the manufacturer are economic heat recovery, proper conduction of the air, and control. The heat can be used in a heat exchanger, for operation of warm water or steam boilers, and for heating rooms indirectly. Direct heat recovery, which would be simple to control is not feasible from an operational point of view. The oxygen level would steadily drop. A look at the costs for indirect heat recovery with sophisticated control in comparison to plants without heat recovery shows that for an economic operation it is important to keep investment costs low (i.e., no heat recovery) if the operating time is short. For long operating times it pays to invest more into the plant. The operating costs decrease for fuel with increasing amount of heat recovered. However, it is not worth recovering.

25260 **APTIC NO. 46420**

Vogt, H.

IT CAN BE DONE WITHOUT MERCURY. *(Es geht auch ohne Quecksilber). Text in German. Umwelt (Duesseldorf), 2(4):54-55, Aug./Sept. 1972.*

In the Federal Republic of Germany most of the chlorine gas production plants operate with electrolytic cells according to the amalgam method. This method has the advantage that the precipitated sodium has good alloying properties which make a diaphragm unnecessary. Moreover, a purer sodium lye can be obtained. The pollution of air and water to which this process contributes has been given little attention. Some of the mercury can be removed by conventional cleaning processes from the sludges, air, and hydrogen. The recent call by the authorities for a reduction of the mercury emission to zero has forced the producers to turn to the old diaphragm electrolysis. A close study of the old diaphragm method revealed that many of the experiences gained with electrolytic cells of the amalgam process can be applied to this process too, bringing considerable improvements. The new cells proved to operate even more economically than the polluting amalgam process.

25261 **APTIC NO. 46642**

Weber, Heinrich and Kurt Tippmer

COKING PLANT GASES TREATMENT BY SCRUBBING WITH AMMONIA VAPORS TO REMOVE HYDROGEN SULFIDE. *(Verfahren zum Entfernen von Schwefelwasserstoff aus Kokereigasen). Text in German. (Assignee not given.) Ger. Pat. 1,494,815. 5p., April 20, 1972. (Appl. Oct. 1, 1970, 2 claims).*

Ammonia scrubbing vapors are introduced to a hydrogen sulfide stripper column at several points to remove hydrogen sulfide from coking plant gases. The NH_3 vapors are introduced preferably at 40-45 C, above the packing of the H_2S stripper column top.

25262 **APTIC NO. 46895**

Wogrolly, Ernst and Heinz H. Butz

PLANNING AND CONSTRUCTION OF MODERN INCINERATION PLANTS. *(Planung und Bau moderner Mullverbreenungsanlagen). Text in German. Umweltschutz Staedtereinig., 9(9):195-200, 1972. 6 refs.*

In order to avoid harmful emissions from incineration plants, the plants must be equipped with suitable combusting systems which when burning polyvinyl chloride keep the emission of hydrochloric acid below the hazardous limits. In order to provide for effective dedusting and cleaning of the flue gases leaving the incineration plant, the flue gases must be cooled and treated in special filter systems. In the case of wet cleaning of the flue gases, the waste water has to be neutralized if necessary before leading it into the sewer.

25263 **APTIC NO. 46497**

Blake, Robert John

SOLVENT MIXTURES FOR SELECTIVELY ABSORBING SULFUR DIOXIDE AND HYDROGEN SULFIDE FROM GASEOUS MIXTURES. *(Verfahren zur selektiven Absorption schwefelhaltigen Gase). Text in German. (Union Carbide Corp., New York) W. Ger. Pat. Appl. 2,134,379. 23p., July 9, 1971. (6 claims).*

Sulfur dioxide and hydrogen sulfide in combustion gases can be selectively absorbed in preference to carbon dioxide by a mixture of water, hydroxy or alkoxy amines, and glycols. A 30% dimethylethanolamine, 10% water, 60% dipropylene glycol mixture contained 12.2% by weight of sulfur dioxide after equilibrium at 60 C.

25264 **APTIC NO. 46608**

Butze, Helmut F. and Jack Grobman

PROGRESS IN REDUCING EXHAUST POLLUTANTS FROM JET AIRCRAFT. *NASA Spec. Publ., no. 270:403-416, May 1971. 3 refs.*

The major contribution of jet aircraft to atmospheric pollution occurs in the vicinity of commercial airports during idling, taxiing, landing, and take-off. Unburned hydrocarbons and carbon monoxide are formed, and emissions of smoke and oxides of nitrogen occur. Reducing exhaust pollutants involves designing the combustor with a fuel-lean primary zone to reduce smoke formation. To maintain high combustion efficiency improved fuel atomization is suggested by using some type of air-assist fuel nozzle. Significantly reduced emissions of NO_x are reported in tests of a short-length combustor. Various design strategies are considered. (Author summary modified)

25265 **APTIC NO. 46505**

Carlson, Gary F. and David E. James

CONCEPTUALIZED FLY-ASH AND SULFUR DIOXIDE SCRUBBING SYSTEM WITH BY-PRODUCT RECOVERY. *Babcock and Wilcox Co., Power Generation Div., National Air Pollution Control Administration Contract CPA 22-69-129, APTD-0967, 13p., Jan. 29, 1971.*

NTIS: PB 210354

A conceptualized air pollution system was established to remove 99% of the fly ash and 97.5% of the sulfur dioxide contained in flue gas. A venturi scrubber was chosen to remove fly ash, and a tray-type absorber was chosen for sulfur dioxide absorption by a slurry of magnesium oxide and magnesium sulfite. Whenever possible, commercially available equipment was used in the design and cost estimate. When commercial equipment was not available, suitable conceptual equipment designs were developed, and the cost of the equipment established. The total delivered and erected cost was $13,663,500.

25266 **APTIC NO. 46628**

Ferrari, Domenic C. and Carl G. Bertram

SEPARATING ORGANIC MATERIALS FROM CHEMICAL WASTE GASES. *(Verfahren und Vorrichtung zum Abscheiden von organischen Stoffen aus chemischen Abgasen). Text in German. (Badger Co., Inc., Cambridge, Mass.) Ger. Pat. 2,112,783. 51p., Dec. 23, 1971. (Appl. March 17, 1971, 35 claims).*

Organic materials can be separated from chemical waste gases by passing the waste gases through at least two cooling stages. In the first stage, water is passed countercurrent to the waste gases at a temperature which approximates the cooling tower temperature, while in the second stage they are cooled by the countercurrent flow of a water-methyl alcohol mixture at a temperature of -3.8 to -1.1 C, causing condensation of the compounds which have an affinity for water. When leaving the second stage, the impurities which remain are removed by a molecular sieve device.

25267 **APTIC NO. 46618**

Hisada, Souichi

CATALYTIC PURIFICATION OF COMBUSTION GASES. *(Verfahren zur Reinigung von Verbrennungsgasen). Text in German. (Assignee not given.) Ger. Pat. 2,119,897. 11p., Nov. 18, 1971. (Appl. April 23, 1971, 5 claims).*

Internal combustion engine exhaust gases containing oxides of nitrogen and sulfuric acid vapors can be purified by passage over a spinel catalyst prepared by heating a mixture of cupric chloride, manganese dichloride, cobaltous chloride, and chromous chloride, with alumina or activated carbon, in the presence of an inert gas. An extremely acid-resistant spinel was produced by a solution containing 1.555 g CuCl2.2H2O, 0.722 g MnCl2.4H2O, 1.302 g CoCl2.6H2O, and 9.730 g CrCl2.6H2O mixed with 100 g Al2O3 heated 2 hr at 1000-1100 C in a quartz oven.

25268 **APTIC NO. 46502**

Hunt, Elton B., Jr. and Karol L. Hujsak

RECOVERY OF FREE SULFUR BY REMOVAL OF HYDROGEN SULFIDE AND SULFUR DIOXIDE IN THE OUTFLOW OF A CONDENSER OF A CATALYTIC REACTION ZONE. *(Verfahren zur Reduktion von in dem Abstrom von Schwefelanlagen enthaltenen Schwefelverbindungen). Text in German. (Amoco Production Co., Tulsa, Okla.) W. Ger. Pat. Appl. 2,105,844. 16p., Jan. 25, 1971. (7 claims).*

Sulfur can be continuously recovered from flue gases by reacting hydrogen sulfide and sulfur dioxide at 120-204 C in a catalyst bed. Sulfur precipitates onto the catalyst and is removed by heating the catalyst to 232-371 C in a flow of gas. The sulfur is then removed from the gas by cooling, and the cooled gas is passed through the catalyst bed to cool it to 121-204 C.

25269 **APTIC NO. 46627**

Kelleher, Raymond Lewis, Ivan A. Shirk, and Timothy Joseph O Leary

REMOVING IMPURITIES FROM INDUSTRIAL EXHAUST GASES AND SIMILAR COMBUSTION PRODUCTS. *(Verfahren Entfernen von Verunreinigungen aus industriellen Abgasen und dergleichen). Text in German. (Gonzaga Univ., Spokane, Wash.) Ger. Pat. 2,025,457. 21p., Dec. 2, 1971. (Appl. May 25, 1970, 27 claims).*

A safe and economic process without resultant air or water pollution is described for purifying waste gases, such as those coming from the catalytic oxidation of naphthalene to phthalic anhydride (I). The gases are subjected to a two-step countercurrent treatment with an aqueous liquid in a packed column, and the resulting water suspension is burned. In the first stage, a portion of the aqueous liquor is recirculated until a liquor containing the relatively insoluble constituents in suspension is obtained. The portion of the suspension withdrawn is fed to a burner at 700-1000 C, where the components are converted to water and carbon dioxide. A portion of the aqueous liquor collected from the second stage is also recirculated, the remainder passing to the first stage.

25270 **APTIC NO. 46494**

Laine, Paul

MOTOR FUEL ADDITIVES FOR REDUCING CARBON MONOXIDE FORMATION DURING COMBUSTION. *(Additiv fuer Brennstoffe zur Verminderung der Verunreinigung durch Kohlenoxyd und es enthaltende Kraftstoffzusammensetzungen). Text in German. (Assignee not given.) W. Ger. Pat. Appl. 2,133,474. 10p., July 6, 1971. (7 claims).*

Petroleum-base diesel motor fuels, especially those containing amounts of ethyl alcohol sufficient to cause engine instability, can be improved by the addition of a mixture of 30-35% benzyl alcohol and 65-70% phenol. Ethyl alcohol combined with the additive has synergistic effects. The addition of 10% 95% Et OH plus 0.2% additive to gasoline can reduce the carbon monoxide content of the exhaust gases by 64-75% even at low speeds.

25271 **APTIC NO. 46501**

Robinson, Isaac Charles Harold

MOTOR FUELS CONTAINING POLLUTION INHIBITORS. *(Kraft- und Brennstoffe). Text in German. (Shell International Research Maatschappij N. V., The Haag (Netherlands)) W. Ger. Pat. Appl. 2,129,461. 21p., June 14, 1971. (18 claims).*

Pollution inhibitors for motor fuels are described which contain polyamines having a monovalent carbon-25 and greater hydrocarbon group bonded directly to a nitrogen atom. For example, a premium grade gasoline containing 0.04% anti-icing agent and 0.025% 20W-50 motor oil was mixed with 0.0025% N,N-dimethyl-N- polyisobutenyl-propylenediamine of molecular weight 1350. The gasoline was tested for its deposit forming tendencies. An amount of 0.4 mg/100 ml gasoline was obtained, compared with 0.8 mg for either additive alone and 1.2 mg for no additive.

25272 **APTIC NO. 46454**

Sliger, A. G., J. A. Bellott, G. M. Drissel, C. J. Royce, and L. J. Scotti

REVIEW OF THE DRY LIMESTONE INJECTION PROCESS. (FINAL REPORT). *Kellogg (M. W.) Co., Piscataway, N. J., Research and Engineering Development, Office of Air Programs Contract CPA 7-68, Task 3, Rept. RED-72-1271, APTD-1136, 276p., May 31, 1971. 37 refs.*

NTIS: PB 211431

Pilot plant studies of calcium oxide-sulfur dioxide reaction systems gave widely divergent results. At 1850 F injection temperature, 2.0 sec gas residence time, a unity stoichiometric ratio, and 74-105 micron particle size of calcite, studies showed 10-15%, 10-30%, and 20-40% CaO utilization. This discrepancy is probably attributable to operating variables. A shrinking core diffusion-reaction model was developed and pertinent constants were derived to fit the available Battelle data with Fredonia Valley Limestone No. 2061. The Kellogg model could not be adequately tested against data from other pilot plant studies because of incomplete stone physical property data. Extensive bench scale studies of the system revealed major effects of the calcination time-temperature relationships on stone properties and sorption characteristics. Limestone calcination studies showed that a high degree of calcination (60-70%) could be achieved in approximately 0.2 sec at temperatures of 1900-2100 F in the actual boiler system. The effects of additives, temperature, particle size, sulfur dioxide concentration, oxygen, and pore size on SO2 absorption are reported. Mass transfer predictions based on generalized theory revealed that the diffusional resistance in the gas-to-solid transfer process can be a major factor in the overall sulfation reaction. The effect of limestone addition on stack gas dust resistivity and electrostatic precipitator collection efficiency was also investigated. Ash sintering strength apparently is lowered in the presence of limestone, which should minimize problems resulting from the build-up of bonded deposits on tube surfaces. Water quality control problems are a critical factor in limiting the applicability of the dry limestone injection process. (Author summary modified)

MEASUREMENT METHODS

1972

25273 **APTIC NO. 46419**

Kontron A. G., Zurich (Switzerland)

SPECTROMETRICS AIR QUALITY ANALYZER IIID2. *(Spectrometrics Air Quality Analyzer III d2). Text in German. Chem. Rundschau (Solothurn), 25(31):999, Aug. 1972.*

The Spectrometics air quality analyzer III d2 is designed for fully automatic determination of sulfur dioxide, nitric oxide, nitrogen dioxide, and ozone. Monochromatic ultraviolet light is passed through a cell containing the sample which is to be analyzed. Through a special device, the light is wobbled. During a scan of 190-400 nm the d2 photometer measures the absorption as a function of the wavelength. Through wobbling of the light and through a special amplifier, a curve is obtained which is proportional to the second derivative of the normal ultraviolet absorption. The analyzer is highly sensitive. Apart from the mentioned components all other gases which absorb in the ultraviolet can be determined.

25274 **APTIC NO. 46581**

CADMIUM. *Am. Ind. Hyg. Assoc. J., 33(2):120, Feb. 1972. 4 refs.*

An analytical guide for the determination of cadmium in air and biological samples is reviewed. Atmospheric samples may be collected on filter paper or by using electrostatic precipitators and impingers. The experimental procedure is described. Analysis is effected using a spectrophotometer or a colorimeter. The technique can determine up to 0.03 mg/cu m of air in a 100-liter sample.

25275 **APTIC NO. 46835**

GRAVIMETRIC DUST COLLECTOR TYPE 113 A. *(Gravimetrischer Staubsammler Type 113A). Text in German. Zentr. Arbeitsmed. Arbeitsschutz, 22(10):VII-VIII, 1972.*

A gravimetric dust collector is described whose stainless steel casing is divided into two chambers. One accommodates the filter, the other the pump, the motor, the battery, the flow meter and the counter. The motor is driven by a nickel-cadmium-battery. The battery capacity is 900 mAh. The dc motor drives the membrane pump which draws the air samples through the horizontal preliminary collector and the following main filter. From here the air flows to the so-called settling chamber and past a flow meter. An aluminum frame holds the filter which can be of any desired material. The filters are weighed in a laboratory, prior to insertion into the collector. After dust collection they are removed and weighed again after 20 minutes of conditioning. The battery must be charged after 8 to 10 hours of operation. The throughput is 2.5 l/min. The dimensions of the unit are 23/12/17.5 cm.

25276 **APTIC NO. 46840**

SENSITIVE METHODS FOR DETECTION OF AIR POLLUTING SUBSTANCES. *(Ein empfindliches Verfahren zum Nachweis von luftverunreinigenden Stoffen). Text in German. VDI (Ver. Deut. Ingr.) Z. (Duesseldorf), 114(14):1033-1034, 1972. 6 refs.*

An opto-acoustical absorption method for the measurement of small concentrations of air pollutants is described. In a chamber the gas sample is intermittently irradiated with light of a certain wavelength in the infrared spectral range emitted by a carbon monoxide or dioxide laser. Because of the modulated radiation flow, the radiation energy absorbed in the gas sample causes periodic temperature changes. This in turn leads to pressure changes in the chamber which are treated likewise periodically. A highly sensitive microphone picks up the periodic pressure changes. The electric output signal is proportional to the radiation flow which enters the chamber as well as the respective absorption intensity. With this method, a nitric oxide concentration down to 0.1 ppm could be measured in a gas sample with a vapor concentration of 10%.

25277 **APTIC NO. 46978**

Alex, W.

PRINCIPLES AND CLASSIFICATION OF COUNTING METHODS IN PARTICLE SIZE ANALYSIS. PART III. *(Prinzipien und Systematik der Zaehlverfahren in der Teilchengroessenanalyse). Text in German. Aufbereitungs-Technik, 13(10):639-652, 1972. 230 refs. Part I, 13(2):105-110, 1972. Part II, 13(3):168-182, 1972.*

Counting methods play an important role in particle size analysis, especially since quantitative television microscopes, the Coulter counter, and light scattering equipment enable quick performance. After some mathematics on distributions and sample size, the principles of counting methods are surveyed and classified. The indirect (imaging) methods use microscopic and macroscopic photography, transmission and scanning electron microscopy, electron probe X-ray microanalysis, micrometers, graticules, quantitative television microscopes, and holography. The direct methods are divided into mechanical counting and counting of field disturbances, the fields being either electrical (Coulter counter), aerodynamical (Langer counter), or optical (Schleusener counter, flow photometers, scattered light counters, and spectrothermal counters).

25278 **APTIC NO. 46697**

Atlasov, A. G., M. S. Minyushina, and V. G. Kotova

DETERMINATION OF STRONGLY ALKALINE AEROSOLS BY MEANS OF A COLORIMETRIC METHOD. *(Opredeleniye aerozolya yedkikh shchelochey kolorimetricheskim metodom). Text in Russian. Gigiena i Sanit., no. 7:76-77, 1972.*

A colorimetric method of great simplicity and reproducibility for the determination of strongly alkaline aerosols, e.g., of sodium hydroxide, is described. A sample volume of 50 liters was taken at a rate of 10 l/min by means of an AFA type filter. Paper filters are not suitable for sampling such aerosols. The eluate obtained from the filter was combined with drops of an indicator containing methyl red, bromothymol blue, phenolphthalein, and alizarine in ethanol for visual colorimetric determination after 20 min against a standard series of NaOH solutions. The sensitivity of the method is 4 micrograms of NaOH/5 ml.

25279 **APTIC NO. 46958**

Attari, Amir and Bruno Jaselskis

SPECTROPHOTOMETRIC DETERMINATION OF SULFUR DIOXIDE BY REACTION OF IRON(III) IN THE PRESENCE OF FERROZINE. *Anal. Chem., 44(8):1515-1517, July 1972. 9 refs. (Presented at the American Chemical Society, National Meeting, 161st, Los Angeles, Calif., April 1971.)*

Reduction of iron(III) by sulfur dioxide in the presence of ferrozine in acetic acid buffer was observed to depend on pH, concentration of acetate ion, time, and the molar ratio of iron(III) to ferrozine. Cary Model 14 and Beckman DB Spectrophotometers were used for the absorbance measurements. Sulfur dioxide in amounts as low as 3.0 micrograms and as high as 60 micrograms were determined using 1-centimeter cells.

25280 **APTIC NO. 46416**

Berner, Axel

PRACTICAL EXPERIENCE WITH A 20-STAGE IMPACTOR. *(Praktische Erfahrungen mit einem 20-Stufen-Impaktor). Text in German. Staub, Reinhaltung Luft, 32(8):315-320, Aug. 1972. 8 refs.*

Theoretical concepts are discussed which are necessary to understand the dimensioning of impactor stages. The 20-stage impactor comprises four indentical cascade impactors each with five stages. The four individual units have a common outlet pipe and are operated simultaneously. Each stage of the compactors has a plate with a circular row of equal-sized nozzles. The impaction surfaces are usually treated with vaseline for better adherence of the dust. For tests with the 20-stage impactor, a 15 micron thick vaseline layer was used. In preliminary tests, coal dust was collected in the impactor. For determination of the collected dust the impaction plates were removed, the dust together with the adhering agent flushed onto a membrane filter, which was then washed several times with pure solvent. Direct weighing of the impaction plates prior to and after collection is not practical with this kind of impactor. The average error of the method is 0.04 plus or minus 0.037 mg. Further measurements with the 20-stage impactor were carried out in a mine. The measurements lasted for 1 hour. The four individual impactors were operated with different throughput rates, namely 14.1 l/min, 10 l/min, 28.3 l/min, 20 l/min. A 6-stage impactor was used parallel to the 20-stage impactor. The impactor is suitable for gravimetric dust measurements. It is a reliable unit for the determination of the total dust concentration. Moreover, different impactors delivered comparable measurement results.

25281 **APTIC NO. 46398**

Bollman, D. H. and D. M. Mortimore

DETERMINATION OF CARBON DIOXIDE, HYDROGEN SULFIDE, SULFUR DIOXIDE, ETHANE, AND PROPANE USING A CARBON MOLECULAR SIEVE COLUMN. *J. Chromatographic Sci., vol. 10:523-527, Aug. 1972.*

A carbon molecular sieve column which included a chromatograph with a thermal conductivity detector was used in parallel with a conventional molecular sieve column to separate carbon dioxide, hydrogen sulfide, sulfur dioxide, ethane, and propane from the gases hydrogen, oxygen, nitrogen, methane, and carbon monoxide. By judicious selection of temperature, these gases may be separated and determined. At 100 C the column is particularly helpful for determining CO2 rapidly in the presence of the other gases listed. The method can be applied to analyzing off gases from furnaces and kilns. Any or all of the gases may be present; one group does not interfere with the separation and analysis of the other group with the opposite column. The conventional molecular sieve column may be used for separating those gases that elute as a composite from the carbon molecular sieve column.

25282 **APTIC NO. 46637**

Carver, Leon D. and Michael C. Lambert

THE NEED FOR PARTICLE SIZE STANDARDS IN FLUID CONTAMINATION MEASUREMENTS. *Contam. Control, 9(3-4):11-17, 29, March-April 1972. (Presented at the Society of Automotive Engineers, Contamination and Filtration Panel, Seattle, Wash., Oct. 1971.)*

There are three basic approaches to measurement of particle size distribution: mechanical separation of size fractions which includes sieve analysis, sedimentation, elutriation, and impaction; microscope analysis; and techniques which use a beam of energy, such as light, electricity, or acoustics. Regardless of the method of analysis used for contamination control, a calibration procedure is needed to standardize results. Calibration requirements, procedures, and materials are considered. Both manual and automatic methods are included. Particle size definitions are cited.

25283 **APTIC NO. 46619**

Chapron, Yves and Henri Francois

OZONE ANALYSIS BY AMPEROMETRIC DETERMINATION OF REACTION PRODUCT OF THE OZONE, OXYGEN AND AN ORGANIC COMPOUND. *(Verfahren zur quantitativen amperometrischen Schnellanalyse von Ozon). Text in German. (Commissariat a l Energie Atomique, Paris (France)) Ger. Pat. 1,698,195. 5p., April 27, 1972. (Appl. Jan. 22, 1968, 3 claims).*

Ozone and oxygen are reacted in the presence of an organic compound catalyst, which is preferably chosen so that the product is a (hydro)peroxide, peracid, or perester. The reaction product is determined in a measuring cell which contains a noble metal indicator electrode placed at the center of a sphere, part of which is formed by the opposing electrode which is formed on the surface of a typically hemispherical hole in a metal block which holds the electrolyte and is also made of noble metal. This shape ensures a large surface area for electrolyte/electrode contact. Ozone is determined quantitatively.

25284 **APTIC NO. 46695**

Chistov, N. M., B. I. Potekhin, and A. M. Andrianov

A DEVICE FOR EXPRESS AIR SAMPLING FOR AEROSOL DETECTION. *(Ustanovka dlya uskorennogo orbora prob dlya opredeleniya aerozoley). Text in Russian. Gigiena i Sanit., no. 8:77-79, 1972.*

A high-performance, compact, portable air sampler, designed for the determination of especially low aerosol concentrations, is described. The sampler, using the fan from a regular vacuum cleaner, is equipped with two rotameters and a throughput control made in the form of sector discs to be shifted axially. The sampling rate may be varied from 20 to 400 l/min, whereas a lower range of 20-200 l/min is usually exploited. Two parallel adapters are used for sampling rates up to 100 l/min. To cope with the high sampling rates, AFA type filters are equipped with supporting gauze. The sampler, though sensible for low temperatures, high humidity, and vibrations, cannot be used in explosive atmospheres. The considerably reduced sampling duration allows short-term variations in the aerosol concentrations to be determined.

25285 **APTIC NO. 46870**

Cooper, Douglas W. and John W. Davis

CASCADE IMPACTORS FOR AEROSOLS: IMPROVED DATA ANALYSIS. *Am. Ind. Hyg. Assoc. J., 33(2):79-89, Feb. 1972. 24 refs.*

In a cascade impactor each stage collects some particles which are outside its assumed range of sizes and fails to catch some particles which are within its assumed range. This difficulty exists in all non-ideal size-classifying instruments and is designated as a problem in cross-sensitivity. Preining s theory for making a first-order correction was adapted specifically to cascade impactors. A discussion of the method of making the correction and an application to real and hypothetical aerosols are presented. (Author abstract)

25286 **APTIC NO. 46585**

Drasche, Heinz, Leo Funk, and Ralf Herbolsheimer

STORAGE OF AIR SAMPLES FOR THE ANALYSIS OF POLLUTANTS, PARTICULARLY CHLORINATED HYDROCARBONS. *(Aufbewahrung von Luftproben fuer die Analyse von Schadstoffen insbesondere von chlorierten Kohlenwasserstoffen). Text in German. Staub, Reinhaltung Luft, 32(9):364-367, 1972. 7 refs.*

The usefulness of plastic bags for the loss-free storage of air samples containing hydrocarbons, halogenated hydrocarbons, or carbon monoxide was investigated. The most suitable material for the manufacture of bags was teflon. Halogenated and aromatic hydrocarbons, and exhaust gases from motor vehicles, with the exception of methane and acetylene, can be stored without loss for several days. Initial concentrations can be reproduced in all cases by heating the bags to 70-100 C before taking samples for analysis. Saran bags can be used for longterm storage without any restrictions in air samples containing CO, methane, or acetylene. Saran and teflon bags were tested with a trichloroethylene/air mixture, with benzene-containing air, CO-laden air, with air samples containing a mixture of hydrocarbons, and with automobile exhaust gases. The bags were stored at room temperature (22 to 25 C). The concentration of CO in the air sample was 139 ppm. While in the Saran bags the CO concentration dropped by 14%; after three days it dropped by more than 40% in the teflon bag.

25287 **APTIC NO. 46701**

Fair, James R., Burton B. Crocker, and Harold R. Null

SAMPLING AND ANALYZING TRACE QUANTITIES. *Chem. Eng., 79(21):146-154, Sept. 18, 1972. 27 refs.*

The problems and concepts involved in sampling and analyzing trace materials in flowing liquids and gases are reviewed. Sampling procedures, representative sampling, nonrepresentative distribution, the effect of the sampling method on the results, sample alteration during sampling, sampling under non-ideal conditions, and monitoring procedures are examined. The principles of the various sampling techniques include sieving, ultrafiltration, elutriation, sedimentation, gravity and centrifugal separation, electrostatic deposition, thermal precipitation, inertial impaction, membrane filtration, and alteration of current flow. Effective criteria for analytical methods are specificity, sensitivity, stability, precision, sample average time, reliability, calibration, response, effect of ambient conditions, and data output. Gas phase analysis based on gas chromatography, spectrophotometry, flame ionization, chemiluminescence, coulometry, colorimetry, and conductrimetric principles for the determination of sulfur dioxide, nitrogen oxides, carbon monoxide, oxidants, and hydrocarbons is reviewed. Optical measurement via microscopy and spot testing is also discussed.

25288 **APTIC NO. 46991**

Fischer G., S. Fodre, and M. Nehez

THE RESULT OF MEASUREMENTS FOR THE DETERMINATION OF TOTAL GERM NUMBER LIMITS IN THE AIR OF OPERATING ROOMS. *(Das Ergebnis der Untersuchungen zur Feststellung von Gesamtkeimzahl-Grenzwerten in der Luft von Operationsraeumen). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 18(10):729-733, 1972. 8 refs.*

For determination of the total germ number in the air of operating rooms, Koch's sedimentation method proved to be the most suitable method, since it requires no special instruments. In each room 10 to 20 Petri dishes were set up. The exposure time was selected according to the expected germ number. The number of colonies developed on the blood agar plates was between 50 and 200. In operating rooms with and without air conditioning a total of almost 3000 air examinations were carried out prior to the beginning of operations and in the second half of the operating period.

25289 **APTIC NO. 46630**

Francois, Gerald W. and Charles Bessel

SMALL ON-LINE COMPUTER CONTROLS EMISSION TEST. *Automotive Eng., 80(6):42, June 1972.*

Small process computers, operating on-line and in real time, control production line emissions testing at two automobile plants. At both plants, an IBM System/7 sits next to the analyzer test bench near the chassis dynamometer. Programmed to test any of the vehicles produced at its plant, each computer issues instructions on the operating mode to be followed by the driver, logs data during the run, and calculates gram/mile emission rates for several pollutants. Hydrocarbon, carbon monoxide, carbon dioxide, and nitrous oxide emissions are monitored.

25290 **APTIC NO. 47056**

Furuta, Tomihiko, John R. Rhodes, and Ben S. Burton

STUDIES OF THE MEASUREMENT OF SULFUR DIOXIDE IN STACK GASES. THE FEASIBILITY OF NUCLEAR METHODS FOR THE DETERMINATION OF SO2 IN STACK GASES. *Nagoya Kogyo Gijutsu Shikenjo Hokoku (Rep. Gov. Ind. Res. Inst., Nagoya), 21(5):114-126, May 1972. 31 refs.*

Sulfur dioxide is the single most objectionable air-pollutant emitted from coal and oil-fired heating and power plants. Fly ash is also emitted. Measurement methods for the determination of SO2 in stack gases include colorimetry, titration, the iodine method, conductivity measurement, infrared spectroscopy, gas chromatography, and particle conversion for condensation nuclei counting. The nuclear and radioisotope techniques include radiometric methods, ionization chamber methods, neutron activation analysis, and radioisotope X-ray absorption and scattering techniques. The radioisotope X-ray fluorescence method is examined in detail.

25291 **APTIC NO. 46694**

Gaziiev, G. A., E. E. Sotnikov, S. A. Filippova, A. P. Dzisyak, and V. P. Kostyukov

A RISE IN THE SENSITIVITY OF THE METHOD OF DETERMINING CARBON MONOXIDE IN THE AIR BY MEANS OF PRELIMINARY CONCENTRATION. ***(Povysheniye chuvstvitel nosti opredeleniya okisi ugleroda v vozdukhe predvaritel nym kontsentrirovaniyem). Text in Russian. Gigiena i Sanit., no. 8:74-77, 1972. 4 refs.***

A method for determining the preliminary concentration of carbon monoxide in the air to increase the sensitivity of the determination is described. The concentration is arrived by means of CaA type molecular sieve (5 Angstrom) at the temperature of liquefied nitrogen. Moisture and carbon dioxide present in the gas mixture are absorbed by silicagel and lime, respectively. The maximum suction rate lies at 100 cu/min. Nearly total separation of CO from air, pure oxygen and nitrogen as carrier gases was reached, while helium and helium-argon mixtures proved to be unsuitable. The volume of the CO gas desorbed ranges from 250 to 450 cu cm. The sensitivity of the consecutive determination by a linear colorimetric method increased to 1 mg/cu m due to the preliminary concentration. A comparison of the data obtained by means of the infrared absorption method (Hartmann-Braun instrument) showed good agreement. The complete analysis took some 40 min.

25292 **APTIC NO. 46924**

Grimmer, Gernot, Armin Hildebrandt, and Heinz Boehnke

SAMPLING AND ANALYTICS OF POLYCYCLIC AROMATIC HYDROCARBONS IN AUTOMOBILE EXHAUST GAS. II. SEPARATION OF THE MIXTURE OF ALL POLYCYCLIC AROMATIC HYDROCARBONS - REPRODUCIBILITY OF THE METHOD. *(Probenahme und Analytik polycyclischer aromatischer Kohlenwasserstoffe in Kraftfahrzeugabgasen. II. Trennung des Gemisches aller polycyclischen aromatischen Kohlenwasserstoffe - Reproduzierbarkeit des Verfahrens). Text in German. Erdoel Kohle (Hamburg), 25(9):531-536, Sept. 1972. 1 ref.*

Capillary gas chromatography and separation on packed high performance columns (about 20,000 HETP) were used to quantitatively determine polycyclic aromatic hydrocarbons from automobile exhausts (phenanthrene, anthracene, benzofluorenes, fluoranthene, pyrene, benzo(a)anthracene, chrysene, triphenylene, benzofluoranthenes, benzopyrenes, perylene, dibenzanthracenes, benzo(ghi)perylene, anthanthrene, and coronene). The evaluation was carried out by comparison of the areas of flame ionization detector signals with added inner standards. For determination of the 12 hydrocarbons (the main components with their methyl derivatives), the gas chromatographic method can be replaced by utilizing extinction differences of the ultraviolet spectrum (baseline technique) after column chromatographic separation on aluminum oxide. The reproducibility of the driving program and of the method of determination was checked by comparison of four European tests of a vehicle under otherwise equal conditions. One vehicle of each of the categories reference weight from 850 to 1020 kg, 1470 to 1700 kg, and 1700 to 1930 kg was checked according to the directions of the Council of the European Community of March 3, 1970. The deviation for 12 hydrocarbons in the series of four European tests was about 15% from the mean value.

25293 **APTIC NO. 46687**

Hahn, Juergen

IMPROVED GAS CHROMATOGRAPHIC METHOD FOR FIELD MEASUREMENT OF NITROUS OXIDE IN AIR AND WATER USING A 5A MOLECULAR SIEVE TRAP. *Anal. Chem., 44(11):1889-1892, Sept. 1972. 7 refs.*

A modified analytical method for the determination of nitrous oxide in air and in water samples is examined. Air was sampled using a membrane pump and then passed through a series of adsorption tubes to remove the atmospheric carbon dioxide and water vapor and to adsorb quantitatively the N2O. For gas chromatographic analysis, a molecular sieve tube loaded with N2O was directly connected to the gas sampling valve of a gas chromatograph equipped with a thermal conductivity detector. The amount of N2O was derived from the area of the N2O peak and a calibration factor. The results of field tests over the Atlantic Ocean are presented. The experimental procedures, field testing techniques, calibration, accuracy, and reliability of the method are reviewed.

25294 **APTIC NO. 47096**

Ito, Shonosuke

METHODS AND TOOLS FOR THE MEASUREMENT OF HYDROGEN FLUORIDE AND CHLORINE GASES. *(Fukka suiso gasu, enso gasu no sokuteiho to kiki). Text in Japanese. PPM (Japan), 3(11):41-47, Nov. 1972.*

The basic methods of hydrogen fluoride analysis include the weight method, the titration method, the absorption spectrometry method, the filter paper fluorescence method, and the ion electrode method. Presently, colorimetry and ion electrode methods are employed in domestically manufactured apparatus. The alkaline filter paper collection method, alizarin complexion method, and Zr-ECR automatic analyzer are explained. The method of concentration, sampling tips such as care against evaporation and splash losses, tearing of filter paper, or dust in the tube, are given. For measuring chlorine gas, orthotolidine chlorine solution is used. Currently commercially available apparatus using orthotolidine colorimetry are discussed with a diagram.

25295 **APTIC NO. 46448**

Kirchner, Kurt

DETERMINATION OF MERCAPTAN IN MERCAPTAN/AIR MIXTURES. *(Zur Bestimmung von Mercaptan in Mercaptan/Luft-Gemischen). Text in German. Chemiker Ztg. (Heidelberg), 96(9):527-529, 1972. 11 refs.*

The method for determination of the mercaptan concentration of a mercaptan/air mixture is based on the conversion of silver nitrate with mercaptan to the almost insoluble silver mercaptide. Concentrations between 0.3 to 100 ppm can be measured. The measurement apparatus comprises the measuring cell containing an alcoholic sodium acetate solution with a known quantity of silver nitrate. A silver/silver sulfide electrode and a glass electrode dip into the liquid. The potential is determined with a suitable potentiometer. The values are recorded by a line recorder as function of the time. With a pump the mercaptan-containing airflow is drawn with constant speed (less than 360 ml/min) through the cell. An activated coal absorber between pump and measuring cell removes the evaporated alcohol. Ozone, nitrogen dioxide, and hydrogen sulfide interfere with the measurement.

25296 **APTIC NO. 46636**

Kohn, Harold W.

STUDENT FLOWMETERS AND AN AIR POLLUTION EXPERIMENT. *J. Chem. Educ., 49(9):643, Sept. 1972. 3 refs.*

A qualitative or quantitative observation of hydrocarbon pollutants in the atmosphere can be made by passing a known amount of gas over a suitable filter. Glass wool will act as an efficient absorbent for atmospheric contaminants and does not retain enough water to interfere with further experimentation. The glass wool should first be cleaned with acetone. In order to have an estimate of air quality some idea of the total flow must be obtained by measuring flow rates. In the absence of a rotometer this can be done with any of three devices illustrated. The pollution experiment and the flowmeters can serve to introduce the general subject of flow, flowmeters, and the principles by which they work to students.

25297 **APTIC NO. 46874**

Ledbetter, Joe E. and Birney R. Fish

THE JET FILTER - A SINGLE-STAGE SIZE-SELECTIVE SAMPLER FOR AIRBORNE PARTICULATES. *Am. Ind. Hyg. Assoc. J., 33(2):90-93, Feb. 1972. 6 refs.*

A jet filter was developed which shows strong indication of being an excellent size selective sampler for airborne particulates. The filter has a combination of desirable characteristics which cannot be found together in any other size selective sampler. (Author abstract modified)

25298 **APTIC NO. 46872**

Lindqvist, F.

A DIFFERENTIAL GALVANIC ATMOSPHERIC OZONE MONITOR. *Analyst (London), 97(1156):549-558, July 1972. 19 refs.*

An automatic atmospheric ozone analyzer was developed, which can perform measurements unattended over periods of several weeks. The principle used involves the liberation of halogen by ozone from a phosphate buffered solution of halide, the halogen concentration being determined gravimetrically. A differential measuring technique with a galvanic cell with two cathodes and one counter electrode is used; background and noise current of the detector are extremely low and stable. Selectivity of the instrument for ozone was demonstrated by laboratory experiments and in field testing. Based on an ozone-to-halogen stoichiometry of 1:1, the instrumental results obtained in field testing were in excellent agreement with those obtained by other techniques applied to and described for the determination of ozone. (Author abstract modified)

25299 **APTIC NO. 46960**

Lucero, Daniel P.

WATER VAPOR SENSITIVITY RESPONSE OF HYDROGEN FLAME IONIZATION DETECTORS. *J. Chromatographic Sci., 10(7):463-467, July 1972. 23 refs.*

An 18.7% sensitivity reduction was observed for a hydrogen flame ionization detector burning in oxygen containing 12.3 mole % water vapor. A continuous air quality monitoring FID at 40 C can experience 4.7% signal changes with variations of 100-50% in atmospheric relative humidity. The variation in sensitivity loss is nonlinear and the rate increases significantly with the oxygen water content. Approximately 1/4 of the total sensitivity reduction is ascribed to the flame temperature drop arising from larger flame heat loss rates and flame gas thermal capacitance induced by the oxygen water. It appears the remaining fraction of sensitivity loss is due to FID electrode inefficiency in collection of the hydrated ions the water vapor molecules form. The FID detectors are often used to measure hydrocarbons in the atmosphere.

25300 **APTIC NO. 47057**

Moriyama, Nobutaka

APPLICATION OF FLUORESCENCE X-RAY ANALYSIS TO PUBLIC NUISANCE MEASUREMENT. *(Kogai sokutei ni okeru keiko X-sen bunsekiho no oyo). Text in Japanese. Nenryo oyobi Nensho (Fuel and Combustion), 39(11):1066-1078, Nov. 1972. 3 refs.*

The principle of the fluorescence X-ray analytical method, the working of the apparatus, the basic mechanism, and the methods of property and quantitative analyses are explained, and its applicability to traceable air pollutants is discussed. In the case of suspended particulates, samples are taken by high-volume air sampler on a glass fiber filter. Elements contained in the filter and filter paper must be examined so that they will not interfere with the calibration. X-ray intensity and atomic absorption index show a linear relationship, and it can be utilized as a calibration curve. When measuring sulfur content in fuel oil, the fuel can be directly poured into a liquid holder and X-rays can be applied. Sensitivity is 1-3 ppm. The fluorescence X-ray method of quantitative analysis is fast, reliable, covers a wide group of elements (fluorine to uranium), and measuring is possible without destroying the test material.

25301 **APTIC NO. 46807**

Morton, Roger R. A. and Alexander E. Martens

ELECTRONIC IMAGE MEASUREMENT. *Res. Dev., 23(1):24-26, 28, Jan. 1972.*

Electronic image measurement using electro-optic and digital processing techniques to count, measure, and analyze microscopic particles and images is reviewed. The instruments perform five major functions: image formation, video conversion, boundary detection, digital analysis, and data processing. The basic operating requirements and variables of two image analyzing instruments are examined.

25302 **APTIC NO. 46409**

Moyers, Jarvis L., Robert A. Duce, and Gerald L. Hoffman

A NOTE ON THE CONTAMINATION OF ATMOSPHERIC PARTICULATE SAMPLES COLLECTED FROM SHIPS. *Atmos. Environ., 6(8):551-556, Aug. 1972. 11 refs.*

Atmospheric particulate samples collected from ships can be contaminated by direct stack effluents; dirt, paint, or rust from the decks and superstructure carried by local wind eddies around the ship; sea salt from bow spray; and the pump and filter holder used for collection. A collection system to avoid these contaminants is described. It consists of a plastic filter holder and protective door mounted on an 8-meter-high tower and controlled by relative wind direction. Condensation nuclei are counted at the top of the tower. Use of this sytem to collect samples on five cruises in the North Atlantic indicates it to be a reliable method for the routine collection of uncontaminated particulate samples over the ocean. (Author abstract modified)

25303 **APTIC NO. 47097**

Nakajima, Hiroto

METHODS AND APPARATUS FOR THE MEASUREMENT OF OXIDANTS. *(Okishidanto no sokutei-ho to sono sokutei sochi). Text in Japanese. PPM (Japan), 3(11):56-61, Nov. 1972.*

As methods of measuring ozone and peroxide, the potassium iodide method, the thiocyanic acid primary iron method, the phenolphthaline method, the mercury vapor reaction method, the rubber deterioration method, and the chemiluminescence method are briefly discussed. Manual oxidant analysis of the neutral potassium iodide method and alkaline potassium iodide method are explained chemically. The more recently developed automatic measuring apparatus using the principles of the neutral potassium iodide method are explained with diagrams and chemical formulas. All the automatic measuring apparatus are either colorimetry, coulometry, or chemiluminescence.

25304 **APTIC NO. 46411**

Portscht, Rainer

COMPARISON OF THE MONOCHROMATIC AND NON-MONOCHROMATIC SMOKE DENSITY MEASUREMENT BASED ON THE EXTINCTION PRINCIPLE. *(Vergleich von monochromatischer und nichtmonochromatischer Rauchdichtemessung nach dem Extinktionsprinzip). Text in German. Staub, Reinhaltung Luft, 32(8):323-328, Aug. 1972. 32 refs.*

To measure the smoke density by the extinction principle, the spectral decadic absorption coefficient is measured by an instrument with monochromatic radiation source and receiver-characteristics. The properties of smoke and the structure of a smoke density meter (double beam compensation principle) are described. With the aid of a computer program, the deflections between the non-monochromatic measurement of the total decadic absorption coefficient and the wanted monochromatic measurement of the spectral decadic absorption coefficient are calculated. Considerable deflections (in the examples up to 15%) are shown in dependence of the chosen radiation source and receiver-characteristics and of the assumed properties of the smoke particles.

25305 **APTIC NO. 46847**

Psaltyra, S. A., N. P. Grekova, and M. I. Bukovskiy

DETERMINATION OF 2,6-DICHLOROPHENOL IN THE AIR. *(Opredeleniye 2,6-dkikhlorofenola v vozdukhe). Text in Russian. Gigiena i Sanit., no. 8:96-97, 1972. 1 ref.*

Optimum conditions for the sampling and photometric determination of 2,6-dichlorophenol in the air by means of 4-aminoantipyrine are described. The absorption of 2,6-chlorophenol vapors from the air is made best by means of a 0.0M solution of sodium tetraborate at a rate not exceeding 1 l/min. The photometric determination by means of 4-aminoantipyrine in the presence of potassium hexacyanoferrite is of high sensitivity, the absorption peak is at 530 nanom. Maximum optical density is reached at a pH value of 8.4, 5 minutes after initiation of the reaction. The standard solution is stable over 15 minutes. The photometric determination of 1-10 micrograms of 2,6-dichlorophenol per 7 ml is possible at an accuracy of + or 0.090-0.085 micrograms.

25306 **APTIC NO. 46684**

Rasmussen, D. V., I. P. Fisher, and J. R. Rowan

THE MASS SPECTROMETRIC DETERMINATION OF CONDENSABLE MATERIALS IN NON-CONDENSABLE MEDIA. *Can. Spectra., 17(13):79-81, May 1972. 9 refs.*

A mass spectrometric method for the quantitative determination of condensable compounds in a non-condensable medium, e.g., air, is examined. By means of a static condensation technique, traces of hydrogen sulfide, carbonyl sulfide, carbon disulfide, methanethiol, ethanethiol, propanethiol, sulfur dioxide, and hydrocarbons were determined at concentrations below 1 ppm. Sample adsorption in the mass spectrometer was recognized, and its effect was minimized by the use of sensitivities obtained from gas blends containing only a few ppm of the standard. Accuracies varied with concentration and the type of compound at + or 10% for most materials at the 5 ppm level. (Author abstract modified)

25307 **APTIC NO. 46443**

Rechenberg, W.

RAPID DETERMINATION OF FLUORIDE IN RAW MATERIALS, CLINKERS AND DUST IN CEMENT MANUFACTURE. *(Schnellbestimmung von Fluorid in Rohstoffen, Klinkern und Staeuben der Zementherstellung). Text in German. Zement-Kalk-Gips (Wiesbaden), 25(9):410-416, 1972. 25 refs.*

At least 90% of the fluoride entering the cement kiln with the raw material leaves the kiln with the clinker. The rest is found in the dust in the form of solid calcium fluoride; the waste gases contain no gaseous fluorides. For better knowledge of the cycles of volatile matter in the cement kiln, an accurate determination is necessary of the fluoride content in silicates, for example in the raw material, the fuel, the cement clinker, and the dust. A modified method was developed to decompose and separate the fluoride in the silicates so it can be determined photometrically. During decomposition with alkalies, 0.1 to 1.0 g of the substance is treated with 4 g of lithium tetraborate by heating at 1000 C in a gold-platinum crucible for 10 minutes. After cooling, the tablet formed as a result of this decomposing conversion process is completely dissolved from the crucible. The tablet is transferred to the distilling flask of a Seel apparatus and decomposed with superheated water vapor in the presence of 20 ml of 60% perchloric acid and 0.7 g of silicagel. A distillation time of 20 minutes is sufficient to liberate 40 to 240 micrograms of fluoride from its compounds and distill it quantitatively into the receiver. The most favorable pH value for the formation of the color complex in the presence of tetraborate is 4.3 + or 0.05. The method has no systematic error and possesses excellent correlation of extinction and concentration with a correlation coefficient equal to 0.999. The fluoride in raw meals, clinkers, and dusts in cement manufacture in a concentration of around 0.03% (by weight) can be determined with a repetition scatter of .0002% (by weight), while corresponding figures for concentrations of around 0.07% and 0.25% are 0.0004% and 0.004% (by weight), respectively. With this method it is possible to carry out 20 fluoride determinations in 2 days.

25308 **APTIC NO. 46921**

Richter, Ekkehard and Siegfried Sattelberger

AUTOMATIC DETERMINATION OF SO_3 CONCENTRATIONS IN FLUE GASES. *(Automatische Bestimmung von SO_3-Konzentrationen in Rauchgasen). Text in German. Brennstoff-Waerme-Kraft, 24(9):339-342, Sept. 1972. 16 refs.*

The two best-known methods for the determination of sulfur trioxide concentrations in flue gases are the Corbett and Flint method and the Goksoyr and Ross method. With the Corbett and Flint method, the sulfuric acid mists of the flue gases are absorbed on a mixture of 80% isopropanol and 20% water. With the Goksoyr and Ross method, the H_2SO_4 mists of the flue gases are condensed in a cooler at a temperature above the water vapor dew point. Theoretically both methods are suitable for automation. The method by Goksoyr and Ross has several advantages over the Corbett and Flint method in this respect, however. The sulfuric acid quantity can be determined by conductivity measurements with only one cell required at the point of measurement. At the same duration of the measurement per analysis, consumption of the chemicals is much lower with the Goksoyr and Ross method. The time lag between sampling and indication of the measured value is smaller. For these reasons the Goksyor and Ross (Shell method) was automized. The operating steps were performed by one compact unit. The flue gas samples were drawn through heated quartz glass pipes and quartz wool filter into the so-called Shell cooler where a temperature of 70 C was maintained. Here the sulfuric acid was selectively condensed. Sampling takes four minutes. After that the Shell cooler was flushed with methanol for six seconds. The electric conductivity of the flushing liquid was measured while the Shell cooler was being tried.

25309 **APTIC NO. 46689**

Rickards, Anthony L.

ESTIMATION OF TRACE AMOUNTS OF CHRYSOTILE ASBESTOS BY X-RAY DIFFRACTION. *Anal. Chem., 44(11):1872-1873, Sept. 1972. 3 refs.*

Two x-ray diffraction techniques, the external standard method and the internal standard method, for the determination of trace amounts of chrysotile asbestos were examined. With suitable equipment and experimental precautions, the techniques can be extended to detect microgram quantities on membrane filters when no interferences are present. The apparatus, preparation of standards, and experimental procedures are described. The detection limits are 10 micrograms for the external standard method and 50-100 micrograms for the internal standard method.

25310 **APTIC NO. 47060**

Roessler, Johannes

CONSIDERATIONS AND EXPERIMENTS FOR THE QUALITATIVE AND QUANTITATIVE MEASUREMENT OF SMOKE PLUMES WITH LIDAR. *(Ueberlegungen und Versuche zur qualitativen und quantitativen Vermessung von Rauchfahnen mit Lidar). Text in German. Staub, Reinhaltung Luft, 32(10):385-390, Oct. 1972. 24 refs.*

The three most common lidar methods, i.e., use of Raman scattering, absorption, and elastic backscattering were tested for measurement of smoke plumes. Backscattering was of the most practical importance. Measurements could be converted only approximately into the required quantities, such as numbered density (cu m) or particle concentration (cu g), and with considerable effort in calculation. In order to obtain values within a reasonable time, an automatic calculator was needed. A television camera was used in which the video signal start and stop a rapid counter. The values produced by the counter are sent to a memory; the data can be recalled any time.

25311 **APTIC NO. 46930**

Sakai, Toru

INSTRUMENTS FOR THE MEASUREMENT OF AIR POLLUTION. *(Taiki osen soluteiyo kiki ni tsuite) Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 39(11):1041-1065, Nov. 1972.*

Environmental standards for various air pollutants, and emission standards are reviewed. Analyses of gaseous pollutants, sampling methods, and measurement apparatus are explained in detail with illustrations and flow charts. Topics covered include absorption spectrometry, atomic absorption spectrometry, fluorescence photometry, high frequency plasma spectrometry, gas chromatography, oxygen analyzer. The methods for analyzing sulfur dioxide, bad odors, nitrogen oxides, oxidants, carbon monoxide, settling particles, suspended particulates, and flue gas by the standard methods are reviewed with flowcharts and illustrations.

25312 **APTIC NO. 46613**

Sakamoto, Syusaku, Yoshiko Baba, Keiko Maeda, Shigeru Suzuki, and Kazuko Okabe

STUDY ON DETERMINATION OF HYDROCARBON IN AIR BY CARBON-HYDROGEN ELEMENTAL ANALYZER. *(Tansuiso bunseki sochi o mochiita kukichu no tanka suiso no teiryo ni tsuite). Text in Japanese. Eisei Kagaku (J. Hyg. Chem.), 18(4):253-255, 1972. 1 ref.*

Using an elementary analytical apparatus for carbon and hydrogen in organic materials, experiments were conducted to determine the amount of hydrocarbon in the atmosphere. Reagents included copper oxide and manganese dioxide. Samples were taken by the water exchange method. The apparatus comprised a gas holder, pressure regulator, and U-shaped tube. The amount of hydrocarbon could be determined more or less by the amount of carbon and hydrogen present in the sample. The results cannot be taken as the accurate amount of hydrocarbon, but the proportions of carbon and hydrogen suggest a possible estimate.

25313 **APTIC NO. 46681**

Stepanova, M. I., P. I. Ilyina, and Yu. K. Shaposhnikov

DETERMINATION OF POLYNUCLEAR AROMATIC HYDROCARBONS IN POLLUTIONS OF CHEMICAL

AND PETROCHEMICAL INDUSTRY. (Opredeleniye poliyadernykh aromaticheskikh uglevodorodov v vybrosakh khimicheskikh i neftekhimicheskikh proizvodstv). Text in Russian. Zh. Analit. Khim. (Moscow), 27(6):1201-1204, June 1972. 17 refs.

A combined method for the thin-layer fractionation and the low- temperature spectral-luminescent determination of mixtures of polycyclic aromatic aromatic hydrocarbons (3,4-benzopyrene, 1,12-benzperylene, 1,2-anthracene, 1,2,5,6-dibenzanthracene and 1,2,3,4-dibenzanthracene) is described. Air samples, of volumes of 250-500 l, were taken by means of non-fluorescent benzene and multiple extraction from waste waters by means of benzene or diethyl ether. The extraction from solids such as dust and soot is best with hot benzene in a Soxhlet apparatus. The chromatographic fractionation on an aluminum oxide layer at a temperature of 27-28 C is done by means of petroleum ether, after which ultraviolet light is used for the preliminary identification. Final identification of the compounds is possible by the quasilinear luminescent spectra. The sample is eluted by means of hot, non-fluorescent n-octane with benzene addition for quantitative determination by luminescent spectral method at the temperature of fluid nitrogen. Except for 1,2,3,4 dibenzanthracene, all other compounds were determined from the relative intensity by means of inner reference.

25314 **APTIC NO. 469[illegible]1**

Stewart, W. H.

AN EASILY CONSTRUCTED ALKALI FLAME IONIZATION DETECTOR. *Anal. Chem., 44(8):1547-1548, July 1972. 6 refs.*

A version of the alkali flame ionization detector which is extremely easy to construct is described. Alkali flame ionization detectors are useful accessories in flame ionization detector gas chromatographs for obtaining enhanced response to nitrogen, phosphorus, sulfur, and halogenated compounds. Optimum operating conditions for the detection of nitrogen compounds are presented, as well as the conditions for detection of hydrogen sulfide.

25315 **APTIC NO. 47092**

Tanaka, Masao

METHODS AND TOOLS FOR MEASUREMENT OF CARBON MONOXIDE AND CARBON DIOXIDE GASES. *(Issanka tanso to tansan gasu no sokutei to kiki). Text in Japanese. PPM (Japan), 3(11):27-32, Nov. 1972.*

As a representative method for measuring carbon monoxide and carbon dioxide, a non-dispersive infrared analyzer is explained in detail with samples of infrared absorption spectrum. In explaining the principles, especially the function of the interference tank for eliminating the influences of other gas elements is explained. The measuring and analysis system for CO in the atmosphere is explained by a flowchart, and the automatic correction system function is explained with a diagram. Measurement of CO using a flame ionization detector (FID) is explained. The CO cannot be measured directly by FID, but when CO is changed into methane in the presence of a nickel base catalyst in hydrogen atmosphere, both CO and hydrocarbons can be measured. A strict adjustment of hydrogen flow and atmospheric flow is required, but the sensitivity of the apparatus is reliable and simultaneous analyses of many elements are possible by FID. A simplified automobile exhaust gas analyzer using the principles of the infrared gas analyzer is explained with illustrations. A constant volume sampler is another simple apparatus for checking the content of automobile exhaust gas.

25316 **APTIC NO. 46845**

Timokhov, K. D. and N. P. Borovichenko

DETERMINING FREE SILICA IN SMALL DUST SAMPLE QUANTITIES BY MEANS OF THE FLUORIDE METHOD. *(Opredeleniye svobodnoy dvuokisi kremniya v malykh naveskakh pyli ftoridnym metodom). Text in Russian. Gigena i Sanit., no. 8:80-81, 1972. 2 refs.*

Statistical investigations of the reliability of the determination of free silica in dust samples of different volumes by the fluoride method are described. The determination of free silica in a 100-milligram sample of ore and rock dusts gives reliable results, which indicates the possibility of the determination without noteworthy error in samples of 30, 15, and even 5 mg. Analyses of dust samples with particles sizes less than 5 micron show partial solution of quartz. The presence in the dust sample of silicates has no significant effect on the determination of the free silica content.

25317 **APTIC NO. 46564**

Tourres, D. A.

TRACE ANALYSIS OF HYDROGEN SULPHIDE AND SULPHUR DIOXIDE BY RAPID, ON-LINE, GAS CHROMATOGRAPHY. *(Analyse rapide en ligne de traces d hydrogene sulfure et d anhydride sulfureux par chromatography en phase gazeuse). Text in French. Chromatographia, 8(5):441-448, 1972. 18 refs.*

Studies concerning the rapid, on-line, gas chromatographic determination of mixtures of hydrogen sulfide (10-500 ppm) with sulfur dioxide (10-1000 ppm) are described. The optimum elution and detection conditions for the determination in helium as carrier gas and by means of flame photometric detector were investigated. Minimum eluate-metal contact, the extensive use of Teflon both for the column and as a carrier of the stationary phase to minimize the adsorption effect, and the use of a stationary phase with medium polarity and of a highly sensitive and selective detection system such as flame photometry were the optimum conditions for rapid, precise, and reproducible determination of H2S and SO2 in their mixtures. Chromatograms showing the separation of H2S and SO2 peaks on different columns (stainless steel, glass, and Teflon) and with different supports (silicagel, Diatoport, Fluoropak, Porapak, and Teflon) and stationary phases (Carbowax, polyphenyl ether, and dinonyl phthalate) are reproduced.

25318 **APTIC NO. 46676**

Vogelsang, Roland

GRAIN SIZE DETERMINATION WITH AUTOMATIC IMAGE ANALYZERS. *(Korngroessenbestimmung mit automatischen Bildanalysengeraeten). Text in German. Staub, Reinhaltung Luft, 32(9):368-372, 1972. 25 refs.*

Measuring and evaluating particle sizes can be simplified by image analyzing computers which comprise a microscope, television camera, a dectector, and a computer. The detecter separates the video signals from the noise signals, and the computer evaluates the signals passed by the discriminator. The particles are counted, and their sizes are determined. However, the results are often incorrect because of intensity changes and the agglomeration of particles, as well as by the low depth of focus of the microscope which makes dust appear to be coarser than it is. The errors can be avoided by producing shadow images by the evaporation technique. The simplification of the measuring operation requires more preparatory work.

25319 **APTIC NO. 47021**

Walker, D. M., M. E. McLain, Jr., and G. W. Leddicotte

SEMICONDUCTOR DETECTOR OPTIMIZATION FOR TRACE MERCURY ANALYSIS IN ENVIRONMENTAL STUDIES. *IEEE (Inst. Elec. Electron. Engrs.) Trans. Nucl. Sci., 19(1):184-190, Feb. 1972. 12 refs.*

The counting of low energy gamma-rays from mercury in activated environmental and biological samples by nuclear activation analysis is often hindered by dominant activity of higher energy gamma-rays from elements such as sodium. An investigation of gamma-ray interaction theory for silicon and germanium at these energies shows that germanium is the preferred material, and that a detector thickness of about 5 mm in the direction of the incident gamma-ray is optimum for mercury counting. Measurements and Figure-of-Merit (FDM) calculations for true coaxial, closed- end coaxial, and thin high resolution planar germanium (lithium) detectors resulted in FOM values for this application of 2.5-4.6 for the large volume coaxial detectors, and 8.0-17.3 for the thin planar detectors. Coincidence counting of the gamma and x-rays can yield large FOM values and separation of the gamma and x-rays in the recorded spectrum. Certain phenomena related to coincident emission, to background efficiency, and to energy resolution are not included in the FOM, and should be considered separately in defining optimum detectors. (Author summary)

25320 **APTIC NO. 46666**

Yatabe, Teruo and Yoshimi Ishihara

THE QUESTIONS AND THEIR SOLUTIONS ON THE METHODS FOR THE DETERMINATION OF NITROGEN OXIDES IN FLUE GASES. *(Hai gasu-chu no chissosankabutsu sokuteiho no mondaiten to sono kairyo). Text in Japanese. Nenryo Kyokaishi (J. Fuel Soc. Japan, Tokyo), 51(545):692-699, Sept. 1972. 8 refs.*

Standard methods for the determination of nitrogen oxides in flue gases were examined and improved. Changes to the naphthylethylenediamine method for nitric oxide analysis included the substitution of oxygen for air as an oxidation reagent; gas sampling after removing sulfur dioxide by passing through hydrogen peroxide solution; and a modified value of 0.7 instead of 0.5 for the ratio of nitrite ion formation from NOx. For the determination of nitrogen dioxide according to this method, changes included cleaning the remaining gases in the absorption vessel; using a Saltzman reagent as the absorption solution; and correcting the sampled gas volume to the same volume of carbon dioxide absorbed into the solution. The phenoldisulfonic acid method for the determination of NOx was improved by using 0.3% of a hydrogen peroxide solution as the absorption solution and by determining the absolute pressure in the gas sampling flask before sampling the gases.

25321 **APTIC NO. 46857**

Yudilevich, M. M., G. V. Nemirov, A. F. Yeliseyeva, G. V. Fokina, and V. V. Kazanskiy

SIMPLE METHOD FOR THE PREPARATION OF GASEOUS MIXTURES FOR LABORATORY TESTS. *(Prostoy metod polucheniya gazovykh smesey v praktike laboratornykh issledovaniy). Text in Russian. Gigiena i Sanit., no. 8:81-83, 1972. 2 refs.*

A simple method for the preparation of gaseous mixtures with known composition is described. The dosaging of the gaseous components into a partially rarefied vessel is done across one-way dosaging glass valves with different path volumes. The sampling from the collecting vessel is done across two absorbers into a suction device in which the water filling is stabilized at the maximum possible level to avoid errors in the determination of the sample volume. The errors of the photocolorimetric determination of known concentrations of nitrogen dioxide (41 micrograms/l) and sulfur dioxide (250 micrograms/l) were in the respective ranges of -16 to +22% and -25 to +5.8%.

25322 **APTIC NO. 46890**

Bezuglaya, E. Yu.

STATISTICAL DETERMINATION OF AVERAGE AND MAXIMUM POLLUTANT CONCENTRATIONS. *(K statisticheskomu opredeleniyu srednikh i maksimal nykh znacheniy kontsentratsiy primesey). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 254:133-139, 1971. 4 refs.*

Recommendations concerning the number of measurements required for the determination of the average and maximum concentrations of sulfur dioxide, nitrogen dioxide, carbon monoxide, and soot in the air are presented. The calculation of the average SO2, NO2, dust, and soot concentrations at a maximum error of 20% requires a minimum of 200 concentration measurements each, and up to 800 when the dispersion is equal to twice the average concentration. Some 150-200 observations are sufficient for the determination of the average CO concentration due to the relatively small degree of dispersion of CO. Pollutant concentration measurements around cities and industrial plants should be performed in periods of possible concentration maxima. A comparison of maximum SO2, NO2, and CO concentrations calculated from a nomogram describing these values as a function of the average concentration and the dispersion with data obtained for 30 cities from measurements shows good agreement, which indicates that maximum concentrations can be determined from calculations.

25323 **APTIC NO. 46632**

Castle, G. S. P. and M. R. Sewell

AN IONIZATION DEVICE FOR AIR VELOCITY AND MASS FLOW MEASUREMENTS. *Preprint, Inst. of Electrical and Electronics Engineers, New York, p. 177-183, 1971. 9 refs. (Presented at the Institute of Electrical and Electronics Engineers, Industry and General Applications Group, Annual Meeting, 6th, Oct. 18-21, 1971.)*

A flowmeter based upon the deflection of air ions in an airstream by a transverse electric field is described. The ionization is produced by alpha radiation from a source mounted on one of the electrodes. Resulting ions follow a path determined by the air velocity, combined with a superimposed electric field having two components: a control or deflection field, and a collection field. Variation of the shape and magnitude of the control field produces an ion current which varies as a function of the air flow. The control field allows the device to be used over a broad range of flows with very little loss of sensitivity. The flowmeter can function as an anemometer, volume flowmeter, or a mass flowmeter, depending upon its design. The device produces no obstruction to the flow and is ideally suited to in-line monitoring applications which require very low pressure losses. (Author abstract modified)

25324 **APTIC NO. 46522**

Cohen, Ariel

THE SIZE SPECTRUM DETERMINATION OF SPHERICAL AEROSOLS BY LIGHT SCATTERING. PART I: METHOD. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 93-99. 6 refs. (Dec. 7-10.)*

NTIS: CONF-711210

Unless the scattering medium is composed of mono-dispersed particles, fluctuation of the scattering intensities with the variation of either the incident wavelength or with the radium of the particles cannot be easily predicted. A method is described for the determination of the size spectrum of spherical particles with a distribution of indices of refraction, which are present in an atmospheric volume containing aerosol particles of unknown nature and a priori based on the properties of the scattering intensity as a function of the size parameter. The method does not require any assumption on the size spectrum function, nor does it demand any knowledge of the type

(refractive index) of the scattering spheres. (Author introduction modified)

25325 **APTIC NO. 46744**

Gallay, Z. A. and I. V. Zveryaeva

THE USE OF URAMYL-N, N-DIACETIC ACID FOR THE AMPEROMETRIC DETERMINATION OF BERYLLIUM. *(Primeneniye uramil-N, N-diuksusnoy kisloty dlya amperometricheskogo opredeleniya berilliya). Zh. Analit. Khim. (Moscow), 26(13):2340-2343, 1971. 8 refs. Translated from Russian. 10p.*

The possibility of using uramyl-N, N-diacetic acid (UMDA) as **the** titrant to determine beryllium by the amperometric titration method was investigated. A drawback to previously developed amperometric methods for determining Be is the fact that Be cannot be titrated in the presence of the other elements that often accompany it in alloys. Current flow was measured by a mirror galvanometer. The indicator electrode was a paraffin impregnated graphite electrode, and a calomel saturated half-cell was used as the comparison electrode in all cases. A peculiarity in the voltampere behavior of this complexone is an increase in its tendency to oxidize at the graphite electrode, which is polarized as the anode, over a wide range of supporting electrolyte pH values. The magnitude of the anode current for oxidation of the reagent was proportional to the concentration of the supporting electrolyte over the range of pH values investigated.

25326 **APTIC NO. 46784**

Kuz mina, T. A. and N. Sh. Vol berg

DETERMINATION OF HYDROFLUORIC ACID IN THE AIR. *(Opredeleniye ftoristogo vodoroda v atmosfernom vozdukhe). Text in Russian. Tr. Glav. Geofiz. Observ. (Leningrad), no. 254:172-177, 1971. 11 refs.*

A colorimetric method for the determination of hydrofluoric acid in the air is described. Sampling is done by means of Richter type absorber equipped with filter, containing 5 ml of twice-distilled water, at a rate of 2-3 l/min over 20 min. The liquid sample thus obtained is combined with zirconium nitrate dissolved in 3.5n-hydrochloric acid. Xylene orange is added after 30 min, and the optic density is determined by means of photoelectric colorimeter after 3-5 min against a calibration curve obtained for a standard series containing 0.125, 0.25, 0.5, 1.0, 2.0, 4.0, 6.0, 8.0, and 10.0 micrograms of F per 5 ml. The sensitivity of the method for a sampling rate of 3 l/min and a sampling duration of 20 min is at 0.002 mg/cu m. The error is + or 6%. While sulfate concentrations occurring in the air do not interfere with the determination, aluminum ion concentrations of 2 micrograms/ml or more cause interference.

25327 **APTIC NO. 46616**

Maples, Dupree and C. A. Whitehurst

THE DESIGN AND CONSTRUCTION OF A HOHLRAUM SPECTRAL ANALYZER. PROGRESS REPORT. *Louisiana State Univ., Baton Rouge, Div. of Engineering Research, National Aeronautics and Space Administration Grant NGR 19-001-024, 14p., 1971.*

NTIS: N71 37957

The Hohlraum Spectral Analyzer will facilitate research in areas where knowledge is far from complete regarding air pollutants: their identity, specific sources, factors governing their dispersion, and chemical and physical changes in the atmosphere. The instrument can also be used to evaluate the role fuel additives play in the composition of motor vehicle gasoline. Light sources, mirrors, detectors, sample compartment, and monochromator and a photomultiplier detector, lead sulfide detector, and thermocouple detector are described. A step-by-step procedure is outlined to illustrate the method for operating the analyzer.

25328 **APTIC NO. 46635**

Martin, C. T. and J. E. Bowie

CONDITIONING OF PULSES FROM AEROSOL-PARTICLE DETECTORS. *In: Technology Utilization. Electronic Test Instrumentation and Techniques. A Compilation. National Aeronautics and Space Administration, Washington, D. C., p. 19-20, 1971.*

A new method of conditioning electrical pulses, generated by aerosol-particle detectors, enables commercial nuclear instrumentation to be used for the particle analysis. Characteristics of the aerosol pulse require a pulse conditioner that must interface with the nuclear energy pulse height analyzer. A pulse conditioner was developed which shapes the pulses in the proper form while processing the amplitude information linearly and over a wide dynamic range. The complete system has immediate application in air pollution studies where particulate size and distribution must be determined.

25329 **APTIC NO. 46521**

Morrison, T. R. and W. A. Solomon

SAMPLING METHOD FOR AIR OR WATER POLLUTION PROFILE MEASUREMENT USING A SINGLE ANALYZER. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 80-83. 1 ref. (Dec. 7-10.)*

NTIS: CONF-711210

A sampling method is described which was developed in the course of a program to obtain vertical profile measurements of the levels of carbon monoxide alongside a roadway. The answer to the sampling dilemma was a means to sequentially analyze samples which had been drawn simultaneously. Ports were distributed on a tower situated in the median strip of a divided highway. Equipment was located in a trailer alongside the highway. Sample lines connecting the ports to the equipment were fairly long, and therefore constituted a significant volume. Sample lines were used as reservoirs to store the samples until they could be analyzed. Operation of the system is considered.

25330 **APTIC NO. 46532**

Sedlacek, William A., Paul R. Guthals, and H. L. Smith

IDENTIFICATION OF AEROSOLS IN THE SOUTHWESTERN UNITED STATES USING ACTIVATION ANALYSIS AND SCANNING ELECTRON MICROSCOPY. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 294-301. (Dec. 7-10.)*

NTIS: CONF-711210

Utilizing Air Force RB-57F and C model aircraft, particles were collected from about 30 different sources, then analyzed by activation analysis and scanning electron microscopy. The trace element content of atmospheric particulates as determined by activation analysis can be used together with their morphological characteristics as determined by microscopy to fingerprint sources of aerosols. The sources of the sampled aerosols were identified as carbon black plants, copper smelters, power plants, incinerators, and others.

25331 **APTIC NO. 46785**

Vol berg, N. Sh.

COULOMETRIC DETERMINATION OF HALOGENATED COMPOUNDS IN THE AIR. *(Kulonometricheskiy metod opredeleniya galogensoderzhashchikh soyedineniy v vozdukhe). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 254:162-171, 1971. 9 refs.*

Methods for the coulometric determination of inorganic and organic halogenated compounds in the air are described. A coulometric cell with a porous silver electrode and electrolyte containing 25% lithium chloride, 0.02% lithium bromide, and

4% acetamide is used for the determination of small concentrations of free halogens at sampling rates of 30-100 ml/min. The cell background current is adjusted to 0.3 microA at at a precision of + or 0.1 microA. Hydrochloric acid and other halogenated compounds require oxidation to free halogen by means of potassium bromate in the presence of lithium chloride applied to a support such as diatomite, prior to determination. The sampling rate should be 100 ml/min. Chlorinated hydrocarbons, to be sampled at a rate of 100 ml/min, are previously oxidized on a catalyst containing at least 1% of platinum applied to silicagel with a specific surface of 300-400 sq m/g at 700-800 C. The current yields of the coulometric cell during the determination of dichloroethane, methylene chloride, and chloroform were 95%, 82% and 92%, respectively. Prototype of a gas analyzer adopting the above coulometric method has been developed. Its sensitivity is 0.1 mg/cu m at a sampling rate of 0.1 l/min.

AIR QUALITY MEASUREMENTS

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25332 **APTIC NO. 46917**

Prefecture de Police, Paris (France), Lab. Central

AIR POLLUTION DUE TO CARBON MONOXIDE. ACTIONS TAKEN BY THE PARIS POLICE HEADQUARTERS CENTRAL LABORATORY. *(Pollution atmospherique par le monoxyde de carbone. Interventions du Laboratoire central de la Prefecture de Police de Paris). Text in French. Tech. Moderne, 64(7-8):25-27, July-Aug. 1972. 1 ref.*

Results of the exhaust carbon monoxide monitorings conducted by the Paris Police Headquarters Central Laboratory in the Paris area in 1970 are presented. Analyses of 15,216 air samples taken by an instantaneous sampling method in 1970 revealed a decrease in the annual average CO level (15.2 ppm compared with 25.9 ppm in 1967), which was the lowest since 1960. The CO concentrations at some intersections were, however, as high as 30-40 ppm, and 0.22% of all samples contained a minimum of 100 ppm of CO. The CO concentrations in underground passages and tunnels showed a declining tendency, with an average of 19.8 ppm. The yearly average was inversely proportional to the wind velocity, and the monthly average was directly proportional to the number of vehicles in use. Daily variations in and maximum hazards due to CO concentrations were determined in another test series by means of an automatic sampler with a recording infrared analyzer supplying 1-hour averages. The CO levels were highest between 8 and 9 am and 6 and 8 pm, negligible during the night and early morning hours, and moderate during weekends. The yearly average as obtained from this series was 4.1 ppm compared with 15.2 ppm by the instantaneous sampling method. Linear correlation with a factor of 0.6 between the two different methods was found.

25333 **APTIC NO. 46825**

Buettner, H.

FIRST RESULTS OF LEAD ANALYSES OF THE AIR IN CONNECTION WITH THE DFG MEASUREMENT PROGRAM. *(Erste Ergebnisse von Blei- Untersuchungen in der Luft im Rahmen eines DFG - Messprogramms). Text in German. In: Blei und Umwelt. Kommission fuer Umweltgefahren des Bundesgesundheitsamtes (West Germany) Arbeitsgruppe Blei, p. 14-20, 1972.*

Dust was collected at four stations with glass fiber filters and analyzed for lead concentration. For this purpose the filters are cut up and extracted with 10% nitric acid. The dissolved lead can be measured by atomic absorption spectrometry. The factor for conversion of peaks into Pb concentrations and the Pb blank value of the filter was determined by calibrating solutions. The results are shown in graphs. The lead concentration in polluted and non-polluted air in micrograms/cu m was mostly higher during cool weather than in warm weather. The values in clean air amounted to about 5-10% of the values in polluted air. The values in clean air amounted to about 10-50% of those in polluted air. In Gelsenkirchen the highest diurnal averages were measured, 6 micrograms/cu m on the inversion day of Jan. 4, 1970 and 20 micrograms/mg on July 4, 1970. The lowest lead concentrations were measured in Westerland. The value dropped mostly with increasing wind velocity and air temperature, as well as decreasing traffic density.

25334 **APTIC NO. 46597**

Fukuoka, Yoshitaka

AIR POLLUTION ALONG THE MOUNTAIN ROAD FOR SIGHTSEEING. *(Sukai rain endo no taiki osen chosa). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 7(1):27-32, Aug. 1972. 6 refs.*

Automotive exhaust gas emissions along the Azuma Skyline Drive of Fukushima Prefecture were investigated, as well as climate, topography, plant damage, traffic conditions, and concentration of pollutants compared with that of Fukushima City. The highway is 29 km long, and lies at an average altitude of 1350 m. The damage to sub-highland plants along the highway has been increasing since the opening of the road in 1959, and is particularly severe during the tourist seasons in May, August, and October. Especially in October, cars driving to view the autumn foliage form a line as long as 1000 m at the central point of the highway. An average of 6 to 7 ppm carbon monoxide, an amount comparable to an urban area, was found on the highway. An average of 0.2 ppm (maximum 0.7 ppm) nitrogen dioxide was detected. In general, a higher concentration of NO2 was noted in sunny spots. That this circumstance results from a photochemical reaction was confirmed by the fact that the CO concentration in tunnels was several times higher than outside, but NO2 was much higher in sunny areas than in tunnels. There was almost no trace of sulfur dioxide.

25335 **APTIC NO. 46780**

Jech, J. and L. Sebova

THE USE OF THE CARBONYL TEST FOR CO MEASUREMENT IN THE OPEN URBAN ATMOSPHERE. *(Uplatneni karbonyltestu pro mereni CO ve volne atmosfere sidlist). Text in Czech. Cesk. Hyg. (Prague), 17(2/3):75-77, 1972. 6 refs.*

A simple instrument was developed in Czechoslovakia under the name Carbonyl-Tester to measure carbon monoxide. The sampled air is pushed through a tube with an indicating filling, and the ensuing discoloration of the filling is then compared with the appearance of a standard filling. Tests were conducted in various street locations in Prague during rush hours over a period of several consecutive days. An average of 6 to 20 mg CO/cu m air, with a few considerably higher peaks, was found, roughly similar to results obtained in various larger European and American cities.

25336 **APTIC NO. 46823**

Jost, D.

THE CONCENTRATION OF AEROSOL-BOUND LEAD IN THE CITY OF FRANKFURT AM MAIN. *(Die Kozentration des aerosolgebundenen Bleis im Stadtgebiet von Frankfurt a. Main). Text in German. In: Blei und Umwelt. Kommission fuer Umweltgefahren des Bundesgesundheitsamtes (West Germany), Arbeitsgruppe Blei, p. 9-11, 1972. 19 refs.*

Aerosol-bound lead has become a world-wide component of air pollution. In St. Moritz, Switzerland, a Pb-concentration of 0.05 to 0.1 micrograms/cu m air has been measured. Over the central Pacific, values of several nanograms Pb/cu m were found. Measurements in Greenland of the Pb concentration in the ice revealed a rapid increase of the atmospheric lead concentration since 1945. Since Sept. 1969 the lead concentration in dust samples obtained at various points in Frankfurt have been analyzed. The Pb concentrations at the various measuring points are markedly influenced by the distance from traffic. Sampling time for the dust samples lasted 8-10 hours. In addition, the Pb concentration during stopped traffic at intersections was also determined. The 95% frequency of values obtained in the latter case was 27 micrograms Pb/cu m. In the city center of Frankfurt the 95% sum frequency was 21 micrograms Pb/cu m. Measurements with a three-stage impactor on the side of a busy street revealed that 30-50% of the entire dust-bound lead is bound to particles with a diameter of less than 0.1 micron.

25337 **APTIC NO. 46836**

Kayser, Karl

RESULTS OF SULFUR DIOXIDE EMISSION MEASUREMENTS IN WESTERLAND/ SYLT WITH THE ULTRAGAS-3-UNIT BY WOESTHOFF. *(Ergebnisse der Registrierung der Schwefeldioxid-Immission in Westerland/Sylt mit dem Ultragas-3-Geraet von Woesthoff). Text in German. Arch. Meteorol. Geophys. Bioklimatol., Ser. B, 20(1):79-87, 1972. 5 refs.*

In Westerland on the Island of Sylt, the sulfur dioxide emissions have been continuously monitored since 1964. The measuring station is located North of the city in the dunes. No major emission sources are in the immediate vicinity. The results of measurements taken during the winter months 1967 to 1968 are discussed. Diurnal averages of up to 115 microgram SO2/cu m were measured. The hourly averages reached a maxima on Dec. 17 1967 with 380 micrograms/cu m. A comparison with similar measurements taken in Vienna shows that a diurnal average of 310 micrograms/cu m was measured there on Jan. 10, 1968. The maximum half hourly average reached was 780 micrograms/cu m on Jan. 14, 1968. The maximum SO2 emission concentrations were measured in Westerland in November with 28 micrograms/cu m and in Vienna in January 1968 with 100 micrograms SO2/cu m. The SO2 emission was lowest at winds coming from the North Sea (N to SSW) and highest by winds coming from land (NNE to S). This can be explained by the fact that emissions from heating systems are brushed over the station by the land winds. Salt particles interfered with the measurements by the Woesthoff unit. With increasing wind velocity the sulfur dioxide concentrations in the atmosphere dropped in Westerland and Vienna.

25338 **APTIC NO. 47002**

Kemeny, Etel and E. C. Halliday

STATISTICS ON SMOKE AND SULPHUR DIOXIDE POLLUTION IN SOUTH AFRICA. PERIOD: OCTOBER, 1969 TO SEPTEMBER, 1970. *Public Health (London), 1972:35-55, Feb. 1972. 3 refs.*

Tables are given containing some data collected by the national survey on smoke and sulfur dioxide in South African cities and towns. The period covered is October 1969 to September 1970. Also published are statistical data which give information about the long-term trends at sampling sites in operation for at least three winter seasons. Smoke pollution shows a downward trend at 11 sampling sites and no significant trends at 11 other sites; sulfur dioxide pollution shows a downward trend at four sampling sites, no significant trends at nine sites, and an upward trend at three sampling sites. (Author summary)

25339 **APTIC NO. 46824**

Kettner, H.

LEAD PRECIPITATION FROM ATMOSPHERIC AIR. *(Bleibefall aus atmosphaerischer Luft). Text in German. In: Blei und Umwelt. Kommission fuer Umweltgefahren des Bundesgesundheitsamtes (West Germany), Arbeitsgruppe Blei, p. 12-13, 1972.*

The lead concentration was determined in dusts which were obtained by dust sedimentation according to the method in the Technical Directives for the Maintenance of Clean Air. For the lead analysis, atomic absorption spectrophotometry was used. Parallel measurements of the lead concentration in fifty samples by the dithizone method yielded a good correlation of 0.96. The average lead precipitation for Wuppertal was 0.165 mg/sq m/day, for Neuss/Rhine 0.22, Duesseldorf 0.31, Muehlheim/Ruhr 0.558, and Duisburg 4.83.

25340 **APTIC NO. 46822**

Lahmann, E.

LEAD IN ATMOSPHERIC AIR. *(Blei in atmosphaerischer Luft). Text in German. In: Blei und Umwelt. Kommission fuer Umweltgefahren des Bundesgesundheitsamtes (West Germany), Arbeitsgruppe Blei, p. 7-9, 20, 1972. 7 refs.*

The lead concentration of atmospheric air can be determined by analysis of the dusts which are separated by filters from air samples. Lead is present in the air in various chemical concentrations, in the solid and gaseous states, and in particles of various size. These various appearances of lead in the atmosphere influence the intake into the organism considerably. For the analytical determination of lead the following methods are mostly used: photometry with dithizone, atomic absorption spectrometry, and X-ray fluorescence spectrometry. In Berlin the following measurements of the atmospheric lead concentration were taken in the course of several years: measurements over one year at the curb of a busy street, measurements over several years at points remote from traffic, random measurements in a street tunnel, and random measurements taken from an automobile during rush hour. The average lead concentrations of the air in streets was in linear relationship with traffic density. Data obtained in the period from April 1966 to March 1967 in a busy street in Berlin-Steglitz yielded a correlation coefficient of 0.78 between traffic density and lead concentration and of 0.86 between carbon monoxide concentration and lead concentration. At remote points in the city of Berlin the lead background concentration was about 0.5 micrograms/cu m air. During unfavorable weather conditions, diurnal averages reached as much as 4 micrograms/cu m air.

25341 **APTIC NO. 46713**

Stante, Aldo, Cosimo Abruzzese, and Gaetano Pepe

AIR POLLUTION IN TARANTO. SEDIMENTATING DUSTS. *(Inquinamento atmosferico a Taranto. Polverosita sedimentabile). Text in Italian. Inquinamento, 14(6):13-19, 1972.*

From May 1970, dust fall in Taranto, a city on the Ionic Sea, has been monitored by 10 stations situated in various locations covering an area of 660 ha. The industrial section includes 20 large stacks in operation 20 out of every 24 hours, and dozens of stacks in intermittent operation. Pollutants are emitted by incineration of refuse, heating installations, automobiles, ships, and port installations. In view of the types of industries represented in Taranto it was found useful to classify water insoluble sedimenting particulates in three categories: those insoluble in nitrohydrochloric acid, iron soluble in nitrohydrochloric acid, and other substances soluble in nitrohydrochloric acid. Industrial pollutants fall into the first two groups, the third group includes pollutants from other sources. Dust fall recorded by four stations nearest to the industrial area fluctuated from a minimum of 18.4 t/sq km/mo (July 1970) to a maximum of 49 t/sq km/mo (March 1972). Dust fall registered by the other six more distant stations diminished with increasing distance from the industrial sector with a maximum of 10.1 t/sq km/mo recorded in January 1971. Seasonal (monthly) effects on dust fall were small, while the effect of daily variations of wind velocity on dust fall was considerable. The analysis of insoluble particulate residues from the industrial zone (Rione Tamburi), differed considerably from that of the remaining sections of the city. The former contained 32% volatile combustible substances (with iron the principal inorganic constituent (29-58%) soluble in nitrohydrochloric acid), while the latter contained only 18% (with an iron content of only 5-39%).

1971

25342 **APTIC NO. 46786**

Pevzner, E. A. and A. S. Zaytsev

AUTOMATIC GAS ANALYZER AND SOME ATMOSPHERIC CARBON MONOXIDE RECORDING RESULTS. *(Avtomaticheskiy gazoanalizator i nekotoryye rezel taty registratsii okisi ugleroda v atmosfernom vozdukhe). Text in Russian. Tr. Glav. Geofiz. Observ. (Leningrad), no. 254:198-204, 1971. 6 refs.*

An automatic optico-acoustic carbon monoxide analyzer, and results of atmospheric carbon monoxide measurements performed by means of such an analyzer in a metropolitan area are described. The GMK-3 type infrared CO analyzer, with differential optical system and direct reading, used a single cuvette of 500 mm length for the three different measuring ranges of 0-40, 0-80, and 0-400 mg/cu m; the error was + or - 5%. A reference cuvette was filled with nitrogen, and filter cuvettes with carbon dioxide were used to abate the interference due to the latter. The gas to be analyzed should be within a temperature range of 10-35 C, and contain not more than 1 g of humidity and 0.001 g of dust/cu m. Measurements by means of such a CO analyzer in a city where traffic was mainly responsible for the atmospheric CO content revealed 20-minute averages of 10-18 mg/cu m. One-hour averages during the nighttime were nearly zero, the highest were 6-15 mg/cu m between 9 and 10 am, and fairly low values of 0-4 mg/cu m occurred on weekends.

ATMOSPHERIC INTERACTION

1972

25343 **APTIC NO. 46816**

Alkezweeny, A. J. and T. J. Lockhart

CLOUD CONDENSATION NUCLEI AND VISIBLE POLLUTION IN LOS ANGELES. *Atmos. Environ., 6(7):481-486, July 1972. 8 refs.*

Simultaneous measurements of cloud condensation nuclei and light scattering in Los Angeles down to a visibility of 7.5 miles are presented. Instruments included a cloud condensation nuclei counter and an integrating nephelometer. Air pollution is a good source of nuclei in Los Angeles, as nuclei concentration increases with decreasing visibility. (Author abstract modified)

25344 **APTIC NO. 47093**

Allen, Robert G.

CONSIDERATIONS FOR EVALUATING REQUIRED STACK HEIGHTS. *Ind. Heating, 39(9):1666-1668, 1670, Sept. 1972.*

In order to determine the necessary stack height required to maintain a minimum ground level pollutant threshold and a maximum emission rate, four basic meteorological conditions must be considered, i.e., the neutral atmosphere (coning), inversion breakup (fumigation), limited mixing (trapping), and aerodynamic downwash. The operational efficiency of high stacks in alleviating air pollution problems related to these conditions are established. The higher the stack, the greater the plume rise and the more frequently stable layers in the lower atmosphere will shield the ground surface.

25345 **APTIC NO. 46799**

Barker, David R. and Harry Zeitlin

METAL-ION CONCENTRATIONS IN SEA-SURFACE MICROLAYER AND SIZE-SEPARATED ATMOSPHERIC AEROSOL SAMPLES IN HAWAII. *J. Geophys. Res., 77(27):5076-5086, Sept. 20 1972. 36 refs.*

A number of sea surface microlayer and marine atmosphere samples were taken from sites in Hawaii over a 2-year period from June 1969 to June 1971. The analysis of samples is reported for sodium, potassium, calcium, magnesium, strontium, copper, iron, and zinc, and some analyses of microlayer samples for marine nutrients are reported as total carbon, total phosphorus, and reactive nitrate. The chemical compositions and ion ratios of most samples differed from normal sea water data collected for these chemical species. Microlayer samples removed from the surface of the open ocean generally had considerably higher total carbon, phosphorus, and nitrate concentrations than samples taken at the same site but at a 0.6-meter depth. Microlayer samples were enriched to a small extent with some alkaline earth metals and to a much larger extent with the transition metals copper, iron, and zinc; the transition metals were also proportionately more organically associated in the microlayer samples. Aerosol samples were enriched in most metals relative to sodium and to the metal to sodium ratio found in sea water. Generally, enrichments were greatest on the smaller aerosols approaching Aitkin size; values were also pronounced for the giant aerosols. It is possible to consider the data in terms of mixing of globally spread, stratospheric continental dust of long residence time and pollution aerosols with normal marine aerosols. It is also important to consider separately or in combination with this concept fractionation and enrichment of selected chemical species before their ejection from the sea surface during agitation and bubbling. (Author abstract modified)

25346 **APTIC NO. 46602**

Berezin, V. M. and N. F. Elansky

THE DISTRIBUTION OF THE TOTAL OZONE AMOUNT IN THE ATMOSPHERE BY SATELLITE OBSERVATIONS. *(Raspredeleniye obshchego soderzhaniya ozona v atmosfere po nablyudeniyam s ISZ). Text in Russian. Izv. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana, 8(5):526-532, 1972. 12 refs.*

The total atmospheric ozone distribution was determined from measurements of the solar ultraviolet radiation reflected by the Earth by means of a satellite during June 17-18, 1966. Correlation calculations and nephelometric analyses showed that the proportion of the radiation reflected from the cloud cover and the Earth's surface is small in comparison with the total reflection flux for wavelengths less than 3055 Angstrom. Gradual change in the Earth's albedo with altitude and latitude within a given spectral section was determined. The fluctuations in the ozone concentration at a given height with time and location were much more pronounced than the fluctuations in the total ozone content. As the coefficient of the correlation between photometer readings and radiation intensity increased with wavelength, the satellite measurements of the dissipated radiation for wavelengths above 3025 Angstrom supplied information on the total ozone layer. The total atmospheric ozone along the projection of the satellite orbit was calculated in the region between 20 deg S and 60 deg N. The ozone distribution was fairly constant, particularly in the equatorial region, while changes in the ozone content over temperate regions occurred possibly within a few hours. The measured latitudinal profile of the total ozone was in good agreement with the results of ground measurements taken at the same time.

25347 **APTIC NO. 46762**

Berlyand, M. Ye.

STATUS AND PROSPECTIVE DEVELOPMENT OF METEOROLOGICAL STUDIES OF ATMOSPHERIC POLLUTION. *In: American Institute of Crop Ecology Survey of USSR Air Pollution Literature. Technical Papers from the Leningrad International Symposium on the Meteorological Aspects of Atmospheric Pollution. Part I. M. Y. Nuttonson (ed.), Vol. 12, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 5-17. 40 refs. Translated from Russian. (Also: Meteorologisheskie Aspekty Zagryazneniya Atmosfery, Leningrad, USSR, July 1968, p. 11-23.)*

NTIS: PB 210381

Theoretical and experimental investigations of the distribution of pollutants in the atmosphere are reviewed, as well as the determination and analysis of the parameters which define the atmospheric diffusion processes. Computers have contributed substantially to the development of diffusion theory, while diffusion equations have been solved for the distribution of pollutants in the presence of inversions, fogs, and various other weather and topographic situations. Experiments have been conducted in wind tunnels, modelling the air current over hilly terrains, and under urban conditions. Many cities have programs for the systematic measurement of pollutant concentrations, along with meteorological observations. Recommendations are made as to areas of needed research. Atmospheric diffusion studies have applications for the efficient release of agricultural herbicides and weather modification techniques.

25348 **APTIC NO. 46767**

Berlyand, M. Ye. and Ye. L. Genikhovich

ATMOSPHERIC DIFFUSION AND STRUCTURE OF THE AIR FLOW ABOVE A NONUNIFORM UNDERLYING SURFACE. *In: American Institute of Crop Ecology Survey of USSR Air Pollution Literature. Technical Papers from the Leningrad International Symposium on Meteorological Aspects of Atmospheric Pollution. Part I. M. Y. Nuttonson (ed.), Vol. 12, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 43-64. 11 refs. Translated from Russian. (Also: Meteorologisheskie Aspekty Zagryazneniya Atmosfery, Leningrad, USSR, July 1968, p. 49-69.)*

NTIS: PB 210381

Dissemination of an impurity over a nonuniform underlying surface is studied. One type of nonuniformity which is considered pertains to surface irregularities characteristic of a hilly terrain, while the other is related to the presence of temperature contrasts arising, for example, at the boundary of water reservoirs. In both cases the investigation is based on the solution of turbulent diffusion equations involving vertical and horizontal components of flow velocity and exchange coefficients over nonuniform surfaces. Calculations were solved with the help of a computer.

25349 **APTIC NO. 46817**

Blifford, Irving H., Jr. and Dale A. Gillette

THE INFLUENCE OF AIR ORIGIN ON THE CHEMICAL COMPOSITION AND SIZE DISTRIBUTION OF TROPOSPHERIC AEROSOLS. *Atmos. Environ., 6(7):463-480, July 1972. 15 refs.*

Chemical and size distribution data and the corresponding air mass trajectories were obtained for aerosols collected at Death Valley, California, and over the Pacific Ocean 250 km west of Santa Barbara. For air masses from the western Pacific, vertical profiles of silicon, an element associated with continental sources, showed virtually no change in concentration with altitude at the offshore location. At this location the concentrations of silicon and chloride in the lowest kilometer of an air mass which had recently passed over land indicated that modification had taken place. Differences in the profiles of Cl concentration over Death Valley and over the Pacific were consistent with the model of Toba for modification of sea salt profiles over land. At altitudes higher than 2.5 km, the concentrations of all of the elements measured were nearly constant. In the lowest kilometer at the ocean and Death Valley locations, size distributions of the aerosols were not greatly different in air masses of different origin. Modification of the chemical composition of aerosol at 300 m altitude in a maritime air mass was observed in measurements made at successive distances from the ocean to 180 km inland over the Orinoco Delta. In general, the relative concentration of particles in the size range between 0.5 and 2 micron radius was larger at altitudes above 2.5 km than at lower altitudes. Thus, a significant relationship between aerosol properties and air mass is indicated only near the surface. (Author abstract modified)

25350 **APTIC NO. 46766**

Bohm, B.

RESULTS OF EXPERIMENTAL STUDY OF SMOKE PLUMES FROM THERMAL POWER PLANTS. *In: American Institute of Crop Ecology Survey of USSR Air Pollution Literature. Technical Papers from the Leningrad International Symposium on Meteorological Aspects of Atmospheric Pollution. Part I. M. Y. Nuttonson (ed.), Vol. 12, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 38-42. Translated from Russian. (Also: Meteorologisheskie Aspekty Zagryazneniya Atmosfery, Leningrad, USSR, July 1968, p. 44-48.)*

NTIS: PB 210381

Using a simple photographic method, smoke plumes were observed in the vicinity of thermal power plants in Opatovice and Tusimice, Czechoslovakia, in 1963 and 1964. Combustion parameters were determined, as well as wind velocity and direction at the height of the stack orifice. An equation was then derived for calculating the height of the plume axis with regard to distance from the stack. Empirical relations were also established for defining ascent height of the plume.

25351 **APTIC NO. 46770**

Budzinski, K.

METHOD OF CALCULATING THE DEGREE OF ATMOSPHERIC POLLUTION. *In: American Institute of Crop Ecology Survey of USSR Air Pollution Literature. Technical Papers from the Leningrad International Symposium on Meteorological Aspects of Atmospheric Pollution. Part I. M. Y. Nuttonson (ed.), Vol. 12, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 82-84. Translated from Russian. (Also: Meteorologisheskie Aspekty Zagryazneniya Atmosfery, Leningrad, USSR, July 1968, P. 86-88.)*

NTIS: PB 210381

To calculate the air pollution level in the vicinity of an emission source, a method is suggested based on the derivation of a concentration distribution function for each point in the area. In comparison with concentration calculation methods, the present procedure makes it possible to determine the frequency of occurrence of different concentration values.

25352 **APTIC NO. 46885**

Bufalini, Joseph J., Bruce W. Gay, Jr., and Kenneth L. Brubaker

HYDROGEN PEROXIDE FORMATION FROM FORMALDEHYDE PHOTOOXIDATION AND ITS PRESENCE IN URBAN ATMOSPHERES. *Environ. Sci. Technol., 6(9):816-821, Sept. 1972. 26 refs. (Presented at the General Motors Corporation, Symposium on Chemical Reactions in Urban Atmospheres, Warren, Mich., Oct. 6-7, 1969 and the American Chemical Society, National Meeting, 161st, Los Angeles, Calif., March 28-April 2, 1971.)*

Hydrogen peroxide was observed both in laboratory studies involving the photooxidation of formaldehyde and in urban atmospheres. In the laboratory studies, the H_2O_2 yield was nonlinear with formaldehyde consumption and decreased in the presence of oxides of nitrogen. The urban atmosphere at Hoboken, New Jersey, contained 4 pphm of H_2O_2 under moderate smog conditions. Under severe smog conditions, the Riverside, California, atmosphere, contained 18 pphm of H_2O_2. (Author abstract modified)

25353 **APTIC NO. 46879**

Chesselet, Roger, Jacques Morelli, and Patrick Buat-Menard

VARIATIONS IN IONIC RATIOS BETWEEN REFERENCE SEA WATER AND MARINE AEROSOLS. *J. Geophys. Res., 77(27):5116-5131, Sept. 20, 1972. 37 refs.*

Atmospheric particles were collected over the open sea (western Mediterranean, North Atlantic, and Norwegian Sea) by air filtration and cascade impactor sampling. The observed potassium/sodium concentration ratios exhibited marked variation and were greater than the reference ratio in bulk sea water. These concentration ratios can be related to the existence of a chemical fractionation affecting the marine aerosols produced by bubbles bursting at the sea surface. Minute amounts of terrigenous dust were found in northern hemisphere marine air in the same range of concentrations as sea salt particles and contained sodium and potassium of primary continental origin. Data based on both laboratory and in situ experiments with artificially produced aerosols, high-volume air sampling over the Antarctic Ocean with controlled low loads of hydro-insoluble dust, and coastal region sampling where silicon, aluminum, iron, and potassium provided a corrective index for potassium-rich terrigenous dust concentrations, provided strong support of the fractionation concept. The chlorine/sodium ratios measured resembled the sea water values, which could indicate that an enrichment of potassium took place, rather than a depletion of sodium. The calcium/sodium ratios often followed the potassium/sodium ratios and suggested identical enrichment of calcium. The enrichments seemed to preferentially affect particles of small size, and the long range transport of fractionated marine aerosols was hypothesized. Potassium/sodium, calcium/sodium, and magnesium/sodium ratios, observed in ice from the central part of the East Antarctic Plateau and corrected for a terrigenous influence with the iron index, suggested a geochemical fractionation at the marine source. (Author abstract modified)

25354 **APTIC NO. 46814**

Covert, D. S., R. J. Charlson, and N. C. Ahlquist

A STUDY OF THE RELATIONSHIP OF CHEMICAL COMPOSITION AND HUMIDITY TO LIGHT SCATTERING BY AEROSOLS. *J. Appl. Meteorol., 11(6):968-976, Sept. 1972. 23 refs.*

A chemically pure aerosol of defined size distribution exhibits a unique growth pattern due to adsorption of water vapor, and to hygroscopic and/or deliquescence effects which are dependent upon relative humidity and which can be followed by measuring light scattering by the aerosol. A number of pure aerosols were produced artificially in the laboratory, subjected to a controlled humidity environment, and the magnitude of their light scattering coefficient measured continuously over a wide range of relative humidity with an integrating nephelometer. The results obtained can be applied to similar measurements on ambient air to yield qualitative chemical information and can be used to determine the amount of visibility degradation which may be attributed to the association of water vapor with atmospheric aerosols. Examples of light scattering-relative humidity relationships for atmospheric aerosols are given. (Author abstract)

25355 **APTIC NO. 46815**

Danard, Maurice B.

NUMERICAL MODELING OF CARBON MONOXIDE CONCENTRATIONS NEAR HIGHWAYS. *J. Appl. Meteorol., 11(6):947-957, Sept. 1972. 11 refs. (Presented at the Air Pollution, Turbulence and Diffusion Symposium, La Cruces, N. Mex., Dec. 7-10, 1972.)*

Numerical models were designed to compute carbon monoxide concentrations in the vicinity of a plane highway and a depressed highway in Toronto. The non-steady two-dimensional diffusion equation is integrated in time until steady conditions are attained. Diffusivities vary both horizontally and vertically. Near the highway, diffusivities are higher over the highway than to the sides. At higher levels, diffusivities are greater for cold air advection than for warm. Winds vary logarithmically with height in the lowest 10 m and linearly above that level. The highway is treated as an area source. Computed concentrations at a fixed measuring site have simple correlation coefficients of 0.82-0.94 with observed concentrations. Numerical simulations show that the order of importance of various factors is, with the most significant one first, low-level diffusivities, wind component perpendicular to the highway, mixing height, and type of advection. The decrease with distance is larger for the depressed highway than for the plane highway. (Author abstract modified)

25356 **APTIC NO. 46405**

DeLuisi, J. J., I. H. Blifford, Jr., and J. A. Takamine

MODELS OF TROPOSPHERIC AEROSOL SIZE DISTRIBUTION DERIVED FROM MEASUREMENTS AT THREE LOCATIONS. *J. Geophys. Res., 77(24):4529-4538, Aug. 20, 1972. 17 refs.*

A statistical technique for deriving size distribution models of tropospheric air-borne particles is described. The technique provides an estimate of the probable average size distribution for any total particle concentration between 0.1 and 10.0/cu cm for three different geographical locations. The size distribution data obtained by Blifford and Ringer are used to derive models of particle size distribution for three locations: Scottsbluff, Nebraska; Death Valley, California, and the Pacific Ocean, 250 km west of Santa Barbara, California. As a special application, these models were fitted by an optimization procedure to the modified gamma distribution function used by Deirmendjian. Some optical scattering properties of these particle models were estimated by use of Mie s solution, and the results are discussed. (Author abstract)

25357 **APTIC NO. 46862**

Dietz, Russell N., Edgar A. Cote, and Robert M. Brown

A PORTABLE ELECTRON CAPTURE GC FOR TRACING AIR POLLUTANTS. *Am. Chem. Soc., Div. Water, Air Waste Chem., Gen. Papers, 12(2):29-35, 1972. 14 refs. (Presented at the American Chemical Society, National Meeting, 163rd, Boston, Mass., April 1972.)*

The portable electron capture gas chromatograph as modified for real-time determination of the inert tracer gas, sulfur hexafluoride, should significantly improve the ability to determine, define, and predict the complex nature of dispersion from single point sources, tall stacks, cities, and highways. Tracing SF_6 with this instrument extends by a factor of 10 or more the distance to which air masses have previously been traced by monitoring sulfur dioxide, particulates, or fluorescent particles. If more sensitive, real-time portable instruments were developed for SO_2, sulfate, or nitrogen oxides and used in conjunction with SF_6, determination of extents and rates of chemical reactions would also be possible. Experimental and airborne plume studies were made. (Author conclusions modified)

25358 **APTIC NO. 46844**

Donaldson, Coleman duP. and Glenn R. Hilst

EFFECT OF INHOMOGENEOUS MIXING ON ATMOSPHERIC PHOTOCHEMICAL REACTIONS. *Environ. Sci. Technol., 6(9):812-816, Sept. 1972. 6 refs.*

The conventional assumption of local uniform mixing of reactive chemical species is reexamined by derivation of the chemical reaction equations to include the effect of locally inhomogeneous mixtures on the reaction rates. Preliminary solutions of a simplified version of these equations show that inhomogeneities in reactant concentration generally tend to slow the reaction rate. Estimates of the relative roles of local diffusive mixing and chemical reactions in inhomogeneous mixtures show that there are several relatively fast photochemical reactions which may be limited by local diffusive mixing. In these cases, the reaction proceeds much more slowly than would be predicted if the reactants were uniformly mixed. (Author abstract)

25359 **APTIC NO. 46401**

Dunskiy, V. F. and L. M. Mondrus

THE CRITICAL STOKES NUMBER IN INERTIAL PRECIPITATION. *Bull. Acad. Sci. USSR Phys. Atmos. Oceans (English Translation from Russian of: Izv. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana), 8(1):54-56, 1972. 5 refs.*

The inertial precipitation of aerosol particles depends on critical conditions such as critical values of the Stokes number. It is an important factor in gravitational coagulation of cloud droplets, in the formation of precipitation, and in the washout of particulates by rain. According to theory, there is no inertial precipitation of particles when the Stokes number is less than critical. Turbulence, the meshing effect, and other factors should cause precipitation even at less than critical Stokes numbers. An experimental investigation of the precipitation of fine droplets was carried out using a fog generator. The Stokes number varied from 0.093 to 0.131 with a water-glycerine mixture and from 0.069 to 0.109 with transformer oil. In all cases, the Stokes number was smaller than the theoretical critical number of 0.384. A near-zero capture coefficient of the plate was found at less than critical Stokes numbers. Thus, the theoretically predicted absence of inertial deposition of particles on a plate in a pipe under subcritical flow conditions was confirmed. With small-scale turbulence existing during the experiment, deposition of particles by eddy diffusion was also absent, for all practical purposes. Although low, the observed settling of particles on the back of the plate from turbulent wake occurred at a higher rate in the subcritical region than the deposition from the stream on the front of the plate. With increasing Stokes numbers, the rate of deposition on the front of the plate increased rapidly, while deposition on the back varied much less strongly.

25360 **APTIC NO. 46993**

Esmen, Nurtan A.

PARTICLE RETENTION EFFICIENCY OF SCAVENGING BY RAINFALL. *Am. Chem. Soc., Div. Water, Air Waste Chem., Gen. Papers, 12(1):12-18, 1972. 2 refs. (Presented at the American Chemical Society, National Meeting, 163rd, Boston, Mass., April 1972.)*

To obtain a rough estimate of the retention efficiency of particle scavenging by rainfall, rain water was collected, filtered through a membrane filter, and the amount of insoluble matter was determined. The average retention efficiency for insoluble particles was 67%. The methodology and results of the experiments are discussed, including a scavenging model.

25361 **APTIC NO. 46973**

Fearraiolo, G. and M. Del Borghi

THE INFLUENCE OF THE INDUSTRIAL PLANT PARAMETERS ON THE NATURE OF EMISSIONS GENERATED SIMULTANEOUSLY BY MULTIPLE POLLUTANT EMISSION SOURCES. THE TWIN SOURCE PROBLEM. *(Influenza dei parametri impiantistici sulle immissioni causate da poliemittenti simultanee di inquinanti atmosferici. I problema delle due sorgenti gemelle). Text in Italian. Riv. Combust. (Milan), 26(7-8):290-298, 1972. 18 refs.*

Bosanquet's and Pearson's mathematical model for the localization of the area of maximal ground level pollution concentration from two concurrent sources was refined by introducing into the calculation the geometry and relative distance of the two sources; also considered by the formula are the height of the plume, Bosanquet's and Pearson's diffusion parameters, the pollution load, wind velocity, and a nondimensional variable parameter between 0 and 1. The formula is a useful tool in the search for optimal solutions to pollution problems from twin sources, for the design of an atmospheric twin dispersion system, and for a quick check of ground level emissions corresponding to known emissions from two sources of pollution.

25362 **APTIC NO. 46391**

Flemming, G.

QUANTITATIVE MAPPING OF LONG TERM SO2 EMISSIONS WITH CONSIDERATION OF WIND CLIMATOLOGICAL AND BIOLOGICAL CONDITIONS. *(Rechnerische Kartierung langfristiger SO2-Immissionen unter Beachtung windklimatologischer und biologischer Bedingungen). Text in German. Z. Meteorol., 23(1/2):36-42, 1972. 25 refs.*

A modified version of the Sutton formula, which includes wind direction frequencies, was used to calculate long-term smoke emission. Several emission fields can easily be combined into one integrated emission chart. The various wind speeds at the various wind directions and the increased turbulence of the northern winds are taken into account. Owing to the inclusion of emission free periods into the averaging, the long-term values are remarkably lower than the usual short-term values. For biological purposes, an emission index can be used which results from the product of the concentration and the root of the emission duration. The wind direction frequency per wind speed ratio is a suitable means for the determination of favorable and unfavorable directions in solving emission problems. The study contains the relevant climatological data. The calculations revealed the distribution of the total emission to the individual smoke sources. Some selected cases illustrate a few particularly significant map surveys for the Bitterfeld industrial area, the Cottbus District, and the GDR total survey.

25363 **APTIC NO. 46425**

Fujii, Toru

AIR POLLUTION CAUSED BY PHOTOCHEMICAL REACTION IN VARIOUS AREAS - OSAKA-FU. *(Kakuchi ni okeru kokagaku hanno ni yoru taiki osen no genjo--Osaka-fu). Text in Japanese. Japan Society of Air Pollution, Proc. Japan Soc. Air Pollut. Meet. Air Pollut. Caused Photochem. Reaction, 1972, p. 197-208. 4 refs.*

The measurement results of oxidant and air pollutant concentrations when injuries were being reported were given. The oxidant concentration was measured by potassium iodide method. Nine days between June and October during 1971 had oxidant concentrations exceeding 0.15 ppm. The highest concentration recorded was 0.24 ppm. Symptoms of body injuries caused by photochemical smog included eye irritation, headache, throat pain, cough, and difficult breathing. Most of the high oxidant concentration occurred at temperatures higher than 26 C, humidity below 61%, and wind velocity below 3 m/sec. The increases of ozone concentration had intimate relations with the variations of total hydrocarbon, sulfur oxide, and nitrogen oxide concentrations.

25364 **APTIC NO. 47098**

Fujimoto, Fumihiko

RADIATION OBSERVATION AT TATENO AEROLOGICAL OBSERVATORY. (PART I). *(Tateno no hosha kansoku to sono kenkyu. (Daiippo)). Text in Japanese. Kisho Kenkyu Jiho (Journal of Meteorological Research) (Tokyo), 24(4):113-138, 1972. 8 refs.*

Solar and terrestrial radiation were observed at Tateno, 60 km north of Tokyo. Linke's turbidity factor for direct solar radiation was derived and its year-to-year variation and relation between the annual extreme values and the vertical distribution of air temperature and wind were considered. The effect of low level inversion and wind profile was significant. Based on comparative data, global radiation on clear winter days in Tokyo was 10% less than that of Tateno where direct atmospheric contamination by industrial activities is absent. A relationship was determined between the turbidity factor and the variation in diffuse radiation on cloudless days at specific solar heights. The relationships between albedo on clear days and solar height and between albedo of direct solar radiation and that of diffuse radiation and the variations in albedo at various values of turbidity factor were examined.

25365 **APTIC NO. 46593**

Fukuoka, Saburo

PHOTOCHEMICAL SMOG IN TOKYO AND THE METEOROLOGICAL CONDITION AT THAT TIME. *(Tokyo kokagaku sumoggu to kisho joken). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 8(9):829-838, Sept. 1972. 5 refs.*

In observing the photochemical smog phenomenon and meteorologic conditions in Tokyo, the following factors were examined: the amount of sunlight and oxidant concentration, the wind and oxidant concentration, sea and land breeze fronts and oxidant pollution covering a wide area, occurrences of high concentrations of oxidant and atmospheric stability, oxidant concentration distribution according to altitude and meteorologic conditions, and patterns of oxidant transition and dispersion. Weather observations made at the three levels (25 m, 125 m, 225 m) of the Tokyo Tower revealed that the instability of atmosphere in the lower layer seemed to cause heavy pollution of all three layers, and that wind had not much to do with the high concentration of oxidant. The patterns of oxidant peaks in various parts of Tokyo show that there are times when the coastal region and the inland areas have a large time lag, whereas the peaks appear simultaneously at other times. This seems to be caused by the sea breeze. The vertical distribution of primary pollutant from the leeward to windward shows that when the emission source is in the windward, the pollutants move and disperse in the lee, and the stable lid in the upper sky prevents upward diffusion. The concentration distribution of the primary pollutant near the emission source shows the peak concentration; but when pollutants move and disperse inland in the lee, the vertical concentration becomes uniform and the absolute index of concentration gradually lowers. According to the simulated model based on the observations of August 1971, the primary pollutant (sulfur dioxide) concentration decreased as it moved further inland, but the secondary pollutant (oxidant) did not. Obviously, the secondary pollutant takes a transitional dispersion pattern different from that of the primary pollutant.

25366 **APTIC NO. 46671**

Fukuoka, Saburo and Toshio Ohira

AIR POLLUTION CAUSED BY PHOTOCHEMICAL REACTION IN VARIOUS AREAS - TOKYO TO. *(Kakuchi ni okeru kokagaku hanno ni yoru taiki osen no genjo-Tokyo-to). Text in Japanese. Japan Society of Air Pollution, Proc. Japan Soc. Air Pollut., Meet. Air Pollut. Caused Photochem. Reaction, 1972, p. 185-196. 7 refs.*

A report is given on the occurrences of high oxidant concentration and their relation with the meteorological conditions from 1967 to 1970 and the photochemical smog occurrence in 1971 in Tokyo. From 1967 to 1970, there were 59 times when the oxidant concentration exceeded 0.15 ppm/hr, and in 1971, there were 34 times, more than half occurred during the months of June, July, and August. The highest concentration recorded was 0.34 ppm/hr. Most of the high oxidant concentrations occurred on a clear day at a temperature between 17 C and 34 C and wind velocity between 1.0 m/sec and 3.9 m/sec. A stable atmosphere was required for the occurrence. Analysis of the photochemical smog which occurred in 1971 revealed that up to approximately 500 m the oxidant concentration at the upper region was generally higher than that on ground. The main component was ozone.

25367 **APTIC NO. 46428**

Gavrilin, B. L., A. P. Mirabel, and A. S. Monin

ON THE ENERGY SPECTRUM OF SYNOPTICAL PROCESSES. *(O spektre energii sinopticheskikh protsessov). Text in Russian. Izv. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana, 8(5):483-493, 1972. 35 refs.*

Experimental studies on the energy spectra of large-scale quasi-horizontal atmospheric motions are reviewed. The spectra considered here contain the region of wave number where they are proportional to k on -3 power as predicted by the hypothesis on the entrophy spectral transfer in two-dimensional flows. Since large-scale atmospheric motions are quasi-horizontal but not two-dimensional due to isoclinic atmosphere with both horizontal and vertical turbulence axes, another hypothesis is proposed for the spectral transfer of potential entrophy in geophysical flows which also leads to k on -3 power-dependence for the energy spectrum. The hypothesis is based upon the law of conservation of potential entrophy in a quasi-geostrophic approach. The results of a numerical experiment on the modeling of quasi-two-dimensional turbulence show the same spectral law, and thus verify the hypothesis on the potential entrophy spectral transfer.

25368 **APTIC NO. 46791**

Gillette, Dale A. and John W. Winchester

A STUDY OF AGING OF LEAD AEROSOLS-I. OBSERVATIONS. *Atmos. Environ., 6(7):443-450, July 1972. 8 refs.*

Alteration of the size distribution of lead aerosols was studied by the sensitive analytical technique of anodic stripping voltammetry and using Andersen Samplers (multistaged cascade impactors) to collect and sort the aerosol by size. Lead aerosol size distributions did not vary greatly from one source area to another, nor did they respond noticeably to change of weather within a source area for 24-hour sampling times. Short-term aging in clear air was studied by comparing the lead size distributions at three locations from downtown Chicago (a source area) with those found several kilometers downwind over Lake Michigan (a non-source area). Long-term aging in clear air was studied by comparing the size distributions of lead aerosols of various ages collected on Lake Michigan. Ages were assumed to be the travel time from shore to the sampling location, computed by a simple trajectory analysis. The aging studies did not show a clear-cut systematic alteration of the lead aerosol size distribution, although the large particle end of the distribution showed reduced relative concentrations for aerosol ages of 6 hours or older. (Author abstract modified)

25369 **APTIC NO. 46792**

Gillette, Dale A.

A STUDY OF AGING OF LEAD AEROSOLS-II. A NUMERICAL MODEL SIMULATING COAGULATION

AND SEDIMENTATION OF A LEADED AEROSOL IN THE PRESENCE OF AN UNLEADED BACKGROUND AEROSOL. *Atmos. Environ., 6(7):451-462, July 1972. 10 refs.*

A numerical model incorporating the mechanisms of thermal coagulation and gravitational sedimentation was constructed to simulate the aging of the lead aerosol size distribution in the presence of a background aerosol. This model showed that coagulation principally removed lead particles from the smallest size ranges and added them to the range from between 0.05 and 0.5 micron, from which removal by coagulation occurred very slowly. Gravitational sedimentation was an important removal mechanism only for particles with a radius greater than 1 micron. (Author abstract modified)

25370 **APTIC NO. 46813**

Gillette, Dale A., Irving H. Blifford, Jr., and Charles R. Fenster

MEASUREMENTS OF AEROSOL SIZE DISTRIBUTIONS AND VERTICAL FLUXES OF AEROSOLS ON LAND SUBJECT TO WIND EROSION. *J. Appl. Meteorol., 11(6):977-987, Sept. 1972. 27 refs.*

To assess wind erosion as a source of atmospheric soil particles, vertical aerosol fluxes near the ground in an eroding field were computed by assuming a vertical transport mechanism similar to that for momentum. Aerosol gradients were measured by totalizing-three-cup anemometers located 1.5, 3, and 6 m above the ground. Information on the aerosol size distributions and quantity in the size range between 0.3 and 6 micron radius was obtained for a variety of erosive conditions in a field in rural Nebraska. The relation of the aerosol size distribution in this range to the size distribution of soil was determined. Horizontal soil particle fluxes were measured and compared to the vertical fluxes. The measured erosion was compared to erosion predicted by an empirical formulation based on the parameters of soil moisture, field length, vegetative residue, mechanical stability, ridge roughness, and vertical momentum flux. Measurements of aerosol size distributions from ground level to 11.9 km on two occasions when soil was very moist and no vertical flux of aerosol was observed showed the aerosol size distribution to be constant in shape and in concentration from the ground to the top of the mixing layer. Above the mixing layer, concentration decreased for all particle sizes above the mixing layer up to the base of the tropopause where an increase in concentration for the smallest particles and a decrease in concentration for the largest particles were observed. (Author abstract modified)

25371 **APTIC NO. 46896**

Green, William D.

MARITIME AND MIXED MARITIME-CONTINENTAL AEROSOLS ALONG THE COAST OF SOUTHERN CALIFORNIA. *J. Geophys. Res., 77(27):5152-5160, Sept. 20, 1972. 7 refs.*

Interactions between marine aerosols and polluted continental air were studied at a coastal sampling station in the Los Angeles basin. Material was collected on filters and salt sensitive impaction slides over a vertical distance of 30 meters in order to contrast differences between fresh aerosols generated in the surf and aged aerosols entering the basin from the open ocean. The diurnal onshore-offshore flow of air was monitored to characterize short-term interactions between heavily polluted air and the marine environment. In the absence of well defined scavenging mechanisms, the removal of nonmarine aerosols and the addition of sea salt during the 12 to 16-hour residence time over the ocean at night was minimal. Analysis of cascade impactor samples collected in relatively clear air indicated a deficiency of chloride in the smaller marine aerosols due to the inclusion of nonchloride particulates from continental sources or other mechanisms. The formation of a highly conductive acid species in these aged aerosols was noted. Large-scale mixing of nitrogen dioxide from continental air is postulated with reactions between salt particles and the gas leading to the formation of nitric acid and the loss of hydrogen chloride in the gas phase. Use of the term maritime aerosol is suggested for mixtures of marine and continental aerosols in the coastal zone. (Author abstract)

25372 **APTIC NO. 46677**

Gusev, A. A. and A. G. Tovpentseva

STUDYING POLLUTANT CONCENTRATIONS NEAR INDUSTRIAL PLANTS IN MODEL EXPERIMENTS BY MEANS OF TRACER ELEMENTS. *(Issledovaniye zagazovannosti atmosfery vblizi predpriyatiy metodom modelirovaniya s primeneniyem mechenykh atomov). Text in Russian. Vodosnabzh. i Sanit. Tekhn., no. 8:30-34, 1972. 15 refs.*

The possible pattern of the sulfur dioxide dispersion around a metallurgical plant to be reconstructed was studied in a model experiment using carbon dioxide for SO2 and krypton-85 as tracers. The flow speed in the aerodynamic tube varied from 1 to 10 m/sec. High concentrations up to a distance about three times the building height on the weather side were determined, while the concentrations on the lee were lower by a factor two to three times that on the weather side. Fresh air intakes should be placed at two opposite ends of the building, and be used alternately depending on the wind direction.

25373 **APTIC NO. 46804**

Junge, C. E.

OUR KNOWLEDGE OF THE PHYSICO-CHEMISTRY OF AEROSOLS IN THE UNDISTURBED MARINE ENVIRONMENT. *J. Geophys. Res., 77(27):5183-5200, Sept. 20, 1972. 48 refs.*

A survey is given of the present knowledge of the marine aerosol. On the basis of the aerosol size distribution in undisturbed marine environments, five different components of the aerosol are discussed: particles with radii larger than 20 micron, sea spray particles, tropospheric background particles, mineral dust particles, and particles with radii smaller than 0.03 micron. Evidence is presented that the troposphere over the oceans is filled with a fairly uniform background aerosol on which the sea spray aerosol is superimposed only within the lowest kilometers above the sea surface. The sea spray component is discussed in detail with respect to size distribution, production, and chemical composition. The various components of the background aerosol seem to be either of continental origin or produced within the atmosphere. New data are presented on the mineral dust component over the Atlantic Ocean that originates from the Sahara. (Author abstract)

25374 **APTIC NO. 46603**

Kaji, Shin

AIR POLLUTION CAUSED BY PHOTOCHEMICAL REACTION IN VARIOUS AREAS - CHIBA PREFECTURE. (MEASUREMENT OF POLLUTANTS AND WEATHER OBSERVATION). *(Kakuchi ni okeru kokagaku hanno ni yoru taiki osen no genjo - Chiba -ken (Osenshitsu no sokuteito kisho kansatsu o chushin ni)). Text in Japanese. Japan Society of Air Pollution. Proc. Japan Soc. Air Pollut., Meet. Air Pollut. Caused Photochem. Reaction, 1972, p. 231-248.*

Air pollutant concentrations and the meteorological conditions at the time of high oxidant concentrations are given. The measurements of oxidants, nitrogen oxides, total hydrocarbons, and sulfur oxides were made by the potassium iodide and spectrophotometric methods. Saltzman and spectrophotometric methods, hydrogen flame ionization detector method, and electric conductivity method, respectively. During 1971, a higher oxidant concentration was found in June than in August, and the higher frequency of occurrence as well. The highest concentrations were always found between 1 to 2 pm at a wind velocity lower than 6 m/sec.

25375 **APTIC NO. 46601**

Kargin, B. A., L. D. Krasnokutskaya, and Ye. M. Feigelson

SOLAR RADIATION REFLECTION AND ABSORPTION BY CLOUD LAYERS. *(Otrazheniye i poglashcheniye luchistoy energii Solntsa oblachnymi sloyami). Text in Russian. Izv. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana, 8(5):505-517, 1972. 19 refs.*

The distribution of photon paths in cloud layers were computed for reflected and transmitted solar radiation by means of the Monte-Carlo method. The albedo and transmittivity of the cloud layers in the water vapor absorption bands were evaluated by means of these distributions and experimental transmission functions. Water droplets play a role in the absorption at wavelengths above 1.3 micron, and the contributions to absorption by water droplets and vapor within a wavelength range of 1.66-2.08 micron are largely equal, while absorption by water droplets at wavelengths above 2.3 micron becomes predominant. The radiation warming-up of the atmosphere and the clouds at high positions of the sun are comparable with the long-wave radiational cooling. The maximum of the absorption of the solar energy lies within the upper layer of the cloud, with some 50% of the total energy being absorbed within the upper 80 m layer. The integral albedo and absorption capacity of a cloud layer are determined as a function of the principal parameters. The integral albedo of the cloud layer is only slightly dependent on the absorption. The albedo as calculated for the conditions of pure scattering may be used for problems of large-scale atmospheric dynamics, and for the absorption, producing essential, though indirect, energetical effect, should be considered.

25376 **APTIC NO. 46909**

Kasatkina, O. I., L. B. Krasilshchikov, Ye. P. Kropotkina, L. B. Rubneva, R. G. Timanovskaya, and Ye. M. Feygelson

ON THE PROBLEM OF OBJECTIVE DETERMINATION OF CLOUD CHARACTERISTICS. *(K voprosu ob ob yektivnom opredelenii kharakteristik oblachnosti). Text in Russian. Meteorol. i Gidrol., no. 8:23-30, Aug. 1972. 12 refs.*

An original method for the determination of quantitative cloud characteristics from measurements of shortwave radiation and infrared cloud radiance is suggested. Simultaneous measurements of the direct solar radiation by means of an actinometer and diffraction spectrograph (angle of vision 1 deg, diaphragm 0.1 mm, dispersion 2 Angstrom/mm) with a combined inertia of 1 sec were performed in an experiment. A statistical evaluation of the relative fluxes of direct integral and spectral radiation was carried out. The frequencies of translucency as obtained by means of the two instruments were comparable. The cloud radiance was studied by means of simultaneous measurements using an actinometer mounted on heliostat and a radiometer directed to the zenith (wave-length 8-12 micron, angle of vision 1.5 deg, inertia 1 sec). The magnitudes of the inhomogeneities of the clouds and of the wind velocities at cloud level were comparable. Measuring the infrared cloud radiance and statistical investigations of the structure of cumuli constitute a potential method for obtaining meteorological characteristics of clouds from their radiation characteristics.

25377 **APTIC NO. 46769**

Kaspshitzky, A.

STATISTICAL FORECASTING AVERAGE ATMOSPHERIC POLLUTION. *In: American Institute of Crop Ecology Survey of USSR Air Pollution Literature. Technical Papers from the Leningrad International Symposium on Meteorological Aspects of Atmospheric Pollution Part I. M. Y. Nuttonson (ed.), Vol. 12, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 78-81. Translated from Russian. (Also: Meteorologisheskie Aspekty Zagryazneniya Atmosfery, Leningrad, USSR, July 1968, p. 82-85.)*

NTIS: PB 210381

The possibility of forecasting the average atmospheric pollution on the basis of predicted values of various meteorological factors, such as wind direction and velocity, daily amount of precipitation, and height and thickness of inversion layer, is considered. Results are based on a statistical analysis of measurements of mean daily dust concentrations, conducted between 1963 and 1965 at a network of stations in Poland. The mean daily dust concentrations were determined by the gravimetric method. From an analysis of the correlation between the mean daily concentration of dust and certain selected meteorological parameters, it can be concluded that the use of a logarithmic transformation for the preliminary normalization of random variables makes it possible to increase the effectiveness of the linear regression equation, i.e., improve use of the information contained in a random sampling.

25378 **APTIC NO. 47058**

Kato, Tatsuo

ELUCIDATION OF PHOTOCHEMICAL SMOG AND PROBLEMS IN COUNTERMEASURES. *(Kokagaku sumoggu no kaimei to taisakujo no mondaiten). Text in Japanese. PPM (Japan), 3(11):2-9, Nov. 1972.*

Using gas chromatography charts of representative city air samples, analyses were made of pollutants and of the process of their chemical transformation into photochemical smog elements. Representative city atmospheres contain three groups of hydrocarbons. The first group contains low hydrocarbons (propane, n-butane, isobutane, propylene, acetylene, 1-butene, isobutene, trans-2-butene, six-2-butene, 1,3-butadiene); the second group comprises aliphatic hydrocarbons; the third group is aromatic hydrocarbons (benezene, toluene, ethylbenzene, and xylene). These patterns are mainly caused by automotive emissions. Exhaust gas is diluted immediately after emission from .01 to .0001. It is diluted further when it moves into residential areas, but various factors change the nature of these hydrocarbons. When nitrogen oxides are added, xylene is affected; light irradiation causes toluene transformation. Toluene, which exists in a great quantity in automotive exhaust, seems to have a photochemical reaction in the presence of nitrogen oxide, changing into a pollutant containing a large amount of acrolein and benzene. The former irritates eyes and the latter is even more toxic.

25379 **APTIC NO. 46592**

Kawamura, Takeshi

METEOROLOGICAL CONSIDERATION ON PHOTOCHEMICAL SMOG. *(Kokagaku sumoggu no kishojo no kosatsu). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 8(9):814-819, Sept. 1972.*

The meteorologic characteristics involved in the mechanism of photochemical smog formation are discussed including weather conditions, representative pressure patterns and the state of the lower atmosphere, and forecasting. The conditions for photochemical smog formation observed in Tokyo and Los Angeles are compared. Photochemical smogs form in Tokyo during June and August, and in Los Angeles, from August to September. Pressure patterns in Tokyo are very unstable and the front, high, and low pressure movements fluctuate greatly. In Los Angeles, the fluctuation of pressure pattern is minimal. In Tokyo, the inversion layer is frontal and of the settling type; in Los Angeles, it is of the settling type. The temperature is above 24 C in Tokyo; in Los Angeles it is between 24 and 32 C. The wind velocity at the site of smog is less than 4 m/sec in Tokyo and less than 3 m/sec in Los Angeles. Visibility is less than 2 to 3 km in Tokyo and is even lower, between 0.8 and 1.6 km, in Los Angeles. Tokyo has at least two or three hours of sunshine before 2 pm before the formation of smog. The sea temperature is 24 to 25 C in Tokyo (July) and is rather high; in Los Angeles, the sea temperature is low. In both cities, oxidant concentration is high within the sea breeze area.

25380 **APTIC NO. 47004**

Kemeny, Etel and E. C. Halliday

THE INFLUENCE OF YEARLY WEATHER VARIATIONS ON SMOKE AND SULPHUR DIOXIDE POLLUTION IN PRETORIA. *Arch. Meteorol. Geophys. Bioklimatol. Ser. B, vol. 20:49-78, 1972. 11 refs.*

In Pretoria, South Africa, atmospheric pollution by smoke and sulfur dioxide shows two distinct seasons: one (October to March) during which the concentrations are low; and another during which the concentrations go through three phases--a phase of general increase (April, May), a phase of maximum concentrations (June, July), and a phase of general decrease (August, September). The two different seasons can be explained by the fact that seven main weather types occur over Pretoria and the South African highveld. Between October and March weather types associated with rain and atmospheric instability predominate whereas between May and September a weather type which is characterized by atmospheric stability prevails. April represents a period of transition between these extremes. The annual and diurnal variations in the concentrations of smoke and sulfur dioxide in the atmosphere which are mainly due to climatic factors are discussed. Also discussed are the long-term trends which indicate that smoke levels have remained fairly constant at the two sites where they have been measured over periods of 13 and 7 years, respectively, whereas the levels of sulfur dioxide have decreased markedly. (Author summary modified)

25381 **APTIC NO. 46672**

Koike, Kazumi

AIR POLLUTION CAUSED BY PHOTOCHEMICAL REACTION IN VARIOUS AREAS - AICHI PREFECTURE. *(Kakuchi no okeru kokagaku hanno ni yoru taiki osen no genjo-Aichi ken). Text in Japanese. Japan Society of Air Pollution, Proc. Japan Soc. Air Pollut., Meet. Air Pollut. Caused Photochem. Reaction, 1972, p. 209-221.*

A report is given on the measurements of oxidant concentrations and their relation with meteorological conditions. There were three days between April and September during 1971 which had oxidant concentrations exceeding 0.15 ppm for more than one hour, and 17 days which had oxidants exceeding 0.10 ppm for more than one hour. The oxidant concentration increased as the wind velocity and humidity decreased and the temperature increased. No relationship was found between the concentration and the amount of clouds, the wind direction, or the visibility. The concentration of oxidants, nitric oxide, and carbon monoxide, showed a maximum value between 7 and 9 am, and 5 and 7 pm, times at which the amount of traffic is heavy. Sulfur oxides and hydrocarbons were also measured.

25382 **APTIC NO. 46798**

Kok, C. J.

SPECTRAL IRRADIANCE OF DAYLIGHT AT PRETORIA. *J. Phys. D, 5(8):1513-1520, Aug. 1972. 16 refs.*

Average spectral irradiance values are given for total daylight, skylight, and south sky irradiances as measured during seven months at Pretoria. Special attention is given to values for an air mass equal to one to enable comparison with data obtained elsewhere. Some results are also given showing the attenuation of daylight irradiance due to smoke and other pollutants. (Author abstract modified)

25383 **APTIC NO. 46596**

Kubo, Hoko

METEOROLOGICAL CONDITION IN PHOTOCHEMICAL SMOG IN OSAKA PREFECTURE. *(Osaka-fu ni okeru kokagaku sumoggu to kisho joken). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 8(9):841-846, Sept. 1972. 6 refs*

The characteristics of temperature and wind velocity, upper air current, weather, stability, atmospheric pressure locations, and the sea breeze front of Osaka Prefecture were investigated in relation to photochemical smogs. Temperature has a significant effect on smog formation; smogs tend to appear on the days when the temperature is higher than 32 C, the wind is about 7 m/sec, and the sky is covered with clouds. Some occurrences of photochemical smogs were noted when the maximum mixing depth was more than 1200 m, but MMD seemed to have no significant relationship. Within reach of sea breezes, smogs occurred after the passing of the front. Oxidant concentration reached 0.10 ppm and higher on two occasions when there was no sun at all. Relationships between wind velocity, temperature and oxidant concentration, duration of sunshine and oxidant concentration are illustrated as well as upper layer meteorologic conditions on days of high oxidant concentration and the characteristics of photochemical smog types.

25384 **APTIC NO. 46894**

Kuhn, Michael

THE SPECTRAL TRANSPARENCY OF THE ANTARCTIC ATMOSPHERE. PART I: INSTRUMENTS AND METHOD OF COMPUTATION. *(Die spektrale Transparenz der antarktischen Atmosphaere. Teil I: Messinstrumente und Rechenmethoden). Text in German. Arch. Meteorol. Geophys. Bioklimatol., Ser. B, 20(2):207-248, 1972. 56 refs.*

During the summers 1966/1967 through 1967/1968, the intensity of direct solar radiation was measured in five spectral bands at Plateau Station, on the central east Antarctic plateau. Intercomparison of three pyrheliometers were evaluated with respect to their differnt angular apertures. The thermal properties of the instruments were considered theoretically and were derived from experiments both in the field and in the laboratory. The laws of atmospheric turbidity were incorporated into a computer program that numerically integrates the solar spectrum, filter transmission, and all processes of extinction. Recent measurements of the extraterrestrial spectrum of solar radiation are discussed critically. The program furnished values of the spectral aerosol extinction, the turbidity, the wavelength exponent, precipitable water, and approximation of total atmospheric ozone.

25385 **APTIC NO. 46929**

Kuroda, Daisuke

SMOG AND PHOTOCHEMICAL SMOG. *(Sumoggu to kokagaku sumoggu). Text in Japanese. Kagaku To Kogyo (Tokyo) (Chem. Chem. Ind.), 6(7):322, 1972.*

The London and the Los Angeles types of smog are explained briefly. The irradiation of the atmosphere containing hydrocarbon and nitrogen oxides by the sun creates ozone, and subsequently oxidant is photochemically created. This reaction can occur at a very low concentration and details are still unclear. The composition conducive to such a reaction is said to be 90% ozone, 10% nitrogen dioxide, and 0.6% organic peroxide. The greatest emission sources are automobiles emitting hydrocarbons and nitrogen oxides. Smog formation is closely influenced both by geographical and social environments, and the effects are particularly harmful where a number of factors are interrelated.

25386 **APTIC NO. 46771**

Lehmann, A.

ON THE DETERMINATION OF DIFFUSION PARAMETERS FOR ACTUAL LOCATIONS. *In: American Institute of Crop Ecology Survey of USSR Air Pollution Literature. Technical Papers from the Leningrad International Symposium on Meteorological Aspects of Atmospheric Pollution. Part I. M. Y. Nuttonson (ed.), Vol. 12. Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 85-98. 5 refs. Translated from Russian. (Also:*

Meteorologisheskie Aspekty Zagryazneniya Atmosfery, Leningrad, USSR, July 1968, p. 89-98.)

NTIS: PB 210381

A method is described for studying wind profiles up to a height of approximately 300 m and diffusion parameters which pertain to atmospheric pollution. Experimental equipment comprised two aerial cameras especially adapted for land stereophotogrammetric photography; the wind gauges used were smoke cartridges 20 cm in size which during their free fall give bands of orange color. Knowing the time-ordered coordinates of the displacement of the smoke bands, the wind velocity profile can be obtained and, from the expansion of the visible outline of the smoke plume, the diffusion parameters can be determined in the direction of the wind. Field tests were conducted.

25387

APTIC NO. 47016

Liou, Kuo-Nan

ELECTROMAGNETIC SCATTERING BY ARBITRARILY ORIENTED ICE CYLINDERS. *Appl. Opt., 11(3):667-674, March 1972. 12 refs.*

Scattering of electromagnetic waves by arbitrarily oriented, infinitely long circular ice cylinders was solved by following the procedures outlined by van de Hulst. Far-field intensities for two cases of a linearly polarized incident wave were derived. The scattering coefficients involved the Bessel functions of the first kind, the Hankel functions of the second kind, and their first derivatives. Calculations were made for ice cylinders at three wavelengths: 0.7, 3, and 10 micron. Numerical results of intensity coefficients are presented as functions of the observation angle phi. A significant cross-polarized component for the scattered field, which vanishes only at normal incidence, is obtained. The numerous interference maxima and minima of the intensity coefficients due to single particle effects depend on the size parameter x as well as on the oblique incident angle alpha. Since cylinder-type particles are often observed in ice clouds, the light-scattering calculations performed for a circular cylinder should be of use in the study of cloud microstructure. (Author abstract modified)

25388

APTIC NO. 46457

Mahrt, Larry Joe

A NUMERICAL STUDY OF ADVECTIVE EFFECTS ON BOUNDARY LAYER FLOW AT LOW LATITUDES. *Wisconsin Univ., Madison, Dept. of Meteorology, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1972, 237p. 99 refs.*

Certain simplified steady boundary layer flows are examined at low latitudes where the Coriolis parameter is small and momentum advections may be large. A multi-level two dimensional numerical model is designed to include a one layer representation of the free atmosphere where pressure adjustments are allowed. Analyses of several finite difference schemes in terms of numerical stability and truncation errors for the equations of motion are conducted to aid in the construction of the model. Two main flow types are found by specifying the pressure or heating field, drift-ordinary boundary layer flow where momentum advections are large, and quasigeostrophic-Ekman flow where advections are small. Quasi-Ekman flow directed toward lower latitudes is modified by momentum advections associated with the latitudinal variation of the Coriolis parameter. 0Low level flow crossing or originating from near the equator is quite different from Ekman flow, due to large horizontal momentum advections in the boundary layer and in the overlying frictionless drift flow. The low level wind vector of this ordinary boundary layer flow rotates more slowly with height and often in the opposite sense of Ekman rotation. The boundary layer depth is considerably thinner than that predicted by Ekman theory, especially near the equator. In contrast to Ekman flow, the cross isobar flow and horizontal divergence increase with height everywhere for slowly varying pressure gradient fields. However, the horizontal divergence may reverse sign with height when the horizontal pressure gradient varies rapidly with latitude. Latitudinal transitions between this flow and quasi-Ekman flow can generate significant vertical motions due to the thicker and stronger cross isobar flow of the ordinary boundary layer. These vertical motions produce significant vertical advections of momentum which can influence the depth of the frictional boundary layer. When the pressure is not specified independent of the flow, mass redistribution by the flow forces pressure adjustments so that in the unheated region the frictionless flow is quasi-nondivergent and the frictionless zonal flow component (which may approximately obey a constant angular momentum latitudinal profile) is quasi-geostrophic. The low pressure system generated by a given specified heating distribution is less intense at lower latitudes where the boundary layer can more easily produce vertical motions. When the flow is forced by latent heat release parameterized in terms of boundary layer vertical motion, the same basic low level flow regimes result that occur with specified pressure or specified heating. (Author abstract)

25389

APTIC NO. 46927

Mayer, Helmut

INVERSIONS IN THE GROUND LEVEL ATMOSPHERE OF KARLSRUHE. *(Inversionen in der bodennahen Atmosphaere ueber Karlsruhe). Text in German. Meteorol. Rdsch., 25(5):153-161. 11 refs.*

After an explanation of the term inversion, the temperature measurements taken by two stations in Karlsruhe are described. The horizontal distance of the two measuring stations is 13 km, the difference in height is 173 m. The measurement program was started in Sept. 1962 and includes the measurement of the relative humidity and temperature. With a curve analyzer, the analogous recordings are converted into digital form from which the hourly average temperature is computed. From the results of the two stations the average temperature gradient can be determined. The maximum absolute error of the temperature gradient determined by this method is not larger than + or 0.4 C/100 m. The maximum ground-level inversions occur in the summer period, the minimum in the winter period. In spring the lowest number of inversions occurs between 3 and 6 pm; in summer, fall, and winter between noon and 3 pm. Inversions of all intensities are most frequently found between 9 pm and 6 am; in summer between midnight and 3 am. The frequency distribution of the total duration of inversions is strongly influenced by radiation. The total duration for all inversion intensities is shortest in winter; while for a temperature gradient of 0.0 to 0.5 C/100 m it is largest in summer; for a temperature gradient of more than 1.5 C/100 m it is largest in fall; and for a gradient of 2.5 to 3.5 C/100 m it is largest in spring.

25390

APTIC NO. 46765

Nemec, L.

METHODS OF CALCULATION OF THE SURFACE CONCENTRATION OF A GASEOUS IMPURITY DISCHARGED FROM AN ELEVATED SOURCE. *In: American Institute of Crop Ecology Survey of USSR Air Pollution Literature. Technical Papers from the Leningrad International Symposium on Meteorological Aspects of Atmospheric Pollution. Part I. M. Y. Nuttonson (ed.), Vol. 12, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 31-37. Translated from Russian. (Also: Meteorologisheskie Aspekty Zagrayzneniya Atmosfery, Leningrad, USSR, July 1968, p. 37-43.)*

NTIS: PB 210381

The intensity of pollution in the atmospheric surface layer by an impurity discharged from an elevated source is mainly characterized by the maximum concentration which can be expected near the source. To calculate or determine this maximum, various formulas have been derived which express the dependence of the maximum on emission and dispersion conditions. Several of these formulas are cited. In Czechoslovakia, the problem of sulfur dioxide emissions from power stations burning brown coal is quite significant, and, in this connection, observations of pollutant concentrations were carried out in the vicinity of two power stations. Emission parameters, plume rise, and meteorological factors were simultaneoulsly observed. Measured maximum concentrations were compared with those computed on the basis of Sutton's equation, and effective source height was determined with a formula proposed by Lucas, Moore, and Spurr. Results from the comparison were then used to develop a method for calculating the atmospheric surface layer pollution which could be expected from large steam plants.

25391 **APTIC NO. 46427**

Ohira, Toshio

QUESTION AND ANSWERS AIR POLLUTION BY PHOTOCHEMICAL REACTION IN VARIOUS AREAS. *(Shitsugi oto Kakuchi ni okeru kokagaku hanno ni yoru taiki osen no genjo). Text in Japanese. Japan Society of Air Pollution, Proc. Japan Soc. Air Pollut., Meet. Air Pollut. Caused Photochem. Reaction, 1972, p. 267-272.*

Answers on various questions concerning air pollution caused by photochemical reaction are given. The questions included eye irritation at high and low pollution concentration, the electron spin resonance spectrophotometric measurement of airborne particulates, particulate concentration in the Osaka area, the effects of time and seasonal variations of solar radiation on air pollution concentrations, and the emission coefficient of automobiles in Japan. The air pollution conditions which affect visibility in many areas are briefly described.

25392 **APTIC NO. 46768**

Onikul, R. I.

PROCEDURE FOR CALCULATING THE POLLUTION OF THE ATMOSPHERE WITH DISCHARGES OF INDUSTRIAL PLANTS AND THERMAL POWER PLANTS. *In: American Institute of Crop Ecology Survey of USSR Air Pollution Literature. Technical Papers from the Leningrad International Symposium on Meteorological Aspects of Atmospheric Pollution. Part I. M. Y. Nuttonson (ed.), Vol. 12, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 65-77. 13 refs. Translated from Russian. (Also: Meteorologisheskie Aspekty Zagryazneniya Atmosfery, Leningrad, USSR, July 1968, p. 70-81.)*

NTIS: PB 210381

A technique is described for calculating stack height and a performance coefficient for cleaning equipment which ensures that the maximum permissible concentration will not be exceeded at power stations or plants. The principal formulas define the most unfavorable combinations of vertical and horizontal turbulent exchange and dangerous wind velocity; climatic conditions, emission dispersion, temperature, and velocity of the flue gases are taken into account. Calculation formulas are based on the numerical solution of turbulent diffusion equations with the help of an electronic computer.

25393 **APTIC NO. 46763**

Parczewski, V.

EFFECT OF THE STABILITY OF THE ATMOSPHERE ON THE DISSEMINATION OF GASEOUS POLLUTANTS. *In: American Institute of Crop Ecology Survey of USSR Air Pollution Literature. Technical Papers from the Leningrad International Symposium on the Meteorological Aspects of Atmospheric Pollution. Part I. M. Y. Nuttonson (ed.), Vol. 12, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 18-24. 3 refs. Translated from Russian. (Also: Meteorologisheski Aspekty Zagryazneniya Atmosfery, Leningrad, USSR, July 1968, p. 24-30.)*

NTIS: PB 210381

The State Hydrometeorological Institute in Warsaw, Poland, is conducting studies on sulfur dioxide and carbon dioxide poilution, as well as both theoretical and observational investigations of the dissemination of industrial emissions. One such project includes the measurement of sulfur dioxide concentrations in the Warsaw area. An atlas of applied climatology is being developed which will include data useful for locating industrial plants; these are essentially annual, seasonal, and monthly maps, and synoptic tables on the frequency and duration of periods of calms and weak winds. The atlas will contain data on the characteristics and intensity of inversions in the lower layers of the atmosphere. The influence of atmospheric stability on air pollution is considered on the basis of observational data on sulfur dioxide concentrations near a steam power plant in the south of Poland.

25394 **APTIC NO. 46455**

Peck, Eugene L.

TERMINAL FORECAST REFERENCE FILE. *Air Weather Service, Hill AFB, Utah, Detachment 6, 70p., Feb. 1, 1972. 41 refs.*

NTIS, DDC: AD 737366

The weather at Hill Air Force Base, located at an altitude of about 4700 ft less than 5 mi from the western foothills of the Wasatch Range in northern Utah, is discussed, including temperature, precipitation, snow, thunderstorms, and winds. Seasonal variations are considered. The principal sources of air pollution at the base are local desert dusts and smoke from industry, especially metallurgical, in the Salt Lake Valley.

25395 **APTIC NO. 46790**

Peterson, James T.

CALCULATIONS OF SULFUR DIOXIDE CONCENTRATIONS OVER METROPOLITAN ST. LOUIS. *Atmos. Environ., 6(7):433-442, July 1972. 5 refs. (Presented at the American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 8th, New York, N. Y., Jan. 1970.)*

Eigenvectors, or empirical orthogonal functions, were previously applied to 24-hour averaged concentrations of sulfur dioxide measured at 40 sites throughout metropolitan St. Louis, Missouri, on 89 days during the winter of 1964-1965. From the selected data, which were first normalized by station, 30 eigenvectors, each with 30 spatially dependent components, and 30 eigenvector coefficients, each with 49 time dependent components, were derived. This can be expressed symbolically as F equal to EC, where F is the observation matrix, E is the orthogonal eigenvector matrix, and C is the orthogonal matrix of eigenvector coefficients. Since each eigenvector has 30 spatially dependent components (i.e., a value at each station) they can be plotted on a map and analyzed. To investigate the physical significance of these derived patterns the relation between the eigenvector coefficients, each with 49 time dependent components (i.e., a value for each day), and various corresponding average daily meteorological parameters was studied. The coefficients were used as dependent variables in multiple regression analyses with the meteorological parameters as independent variables. Significant meteorological parameters, notably wind direction, accounted for an average of about 75% of the variance of the first three coefficients. These statistically derived relations were used here with independent meteorological data to calculate SO2 concentrations at the St. Louis sites. Comparisons between the results of several sets of such calculations and observed SO2 values are presented. (Author abstract modified)

25396 **APTIC NO. 46683**

Pilie, R., W. Eadie, E. Mack, C. Rogers, and W. Kocmond

PROJECT FOG DROPS. PART I: INVESTIGATIONS OF WARM FOG PROPERTIES. *Cornell Aeronautical Lab., Inc., Buffalo, N. Y., National Aeronautics and Space Ad-*

ministration Contract ***NASW-2126, NASA CR-2078, RM-3005-Mn5, 126-61-13-01-10, 150p., Aug. 1972. 39 refs.***

The micrometeorological and microphysical characteristics of valley fogs occurring near Elmira, New York were studied in detail to collect data on temperature, dew point, wind speed and direction, dew deposition, vertical wind velocity, and net radiative flux. In fog, visibility was continuously recorded, and liquid water content and drop size distribution were periodically measured. Vertical temperature distribution in the lowest 300 m and cloud nucleus concentrations at several altitudes were measured from an aircraft before fog formation. A numerical model developed to investigate the life cycle of radiation fogs, including the nocturnal cooling of the earth s surface, dew formation, fog drop sedimentation, and the absorption of infrared radiation by fog, is presented. Complete measurement results and correlation of actual data with model predictions are included. (Author abstract modified)

25397 **APTIC NO. 46773**

Pinus, N. Z.

ATMOSPHERIC TURBULENCE AT SMALL HEIGHTS.

In: American Institute of Crop Ecology Survey of USSR Air Pollution Literature. Technical Papers from the Leningrad International Symposium on Meteorological Aspects of Atmospheric Pollution. Part I. M. Y. Nuttonson (ed.), Vol. 12, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 110-129. 24 refs. Translated from Russian. (Also: Meteorologisheskie Aspekty Zagryazneniya Atmosfery, Leningrad, USSR, July 1968, p. 109-129.)

NTIS: PB 210381

Utilizing aircraft, captive balloons, and radar, investigations were carried out which indicated that atmospheric turbulence defined as the ratio of the mean square deviation to the mean flow rate is equal, on the average, to 0.1 under indifferent thermal stratification near the ground surface, to 0.03 under stable stratification, and 0.3 or more under unstable stratification. Turbulence intensity decreases with distance from the underlying surface and is inversely proportional to approximately the square root of the height. The boundary between turbulent and laminar parts of air flow is described, as well as various features of the wind velocity components.

25398 **APTIC NO. 46711**

Possanzini, Massimiliano and Arnaldo Liberti

MATHEMATICAL MODEL FOR THE EVALUATION OF FREQUENCY DISTRIBUTION OF CONCENTRATIONS OF AN ATMOSPHERIC POLLUTANT.

(Modello matematico per la valutazione della frequenza dei valori di concentrazione di un inquinante atmosferico). Text in Italian. Inquinamento, 14(5):23-27, June 1972. 2 refs.

A mathematical model permitting the forecasting of the concentration of a pollutant for different time periods and cumulative frequencies was developed from sulfur dioxide monitoring data recorded by a station in Rome for the period from Jan. 1, 1970 until Dec. 31, 1971. In daily collected samples, SO2 was determined by the paratosaniline method; 504 data were used (69% for the 2-year period). The curve of relative frequency distribution is asymmetrical with a very steep ascending and descending bulge with a long tail to the right of the maximum. If instead of the concentration, its logarithm is plotted, on the abscissa a Gaussian curve results indicating an approximately lognormal distribution. Equations were derived for standard geometric deviations, for geometric averages for an averaging time, and for expected maximum annual concentrations. From these a mathematical model was constructed in which concentrations are distributed approximately lognormally for all averaging times; the maximum concentration is approximately proportional to averaging time raised to an exponent; the arithmetic mean of concentrations is the same for all averaging times. For the longest mean time (1 year), the arithmetic mean, the geometric mean, and the maximal and minimal concentrations are all the same and thus can be represented by a single point. According the the mode, a daily SO2 concentration of 0.15 ppm occurs with a frequency of 10%, a half hour concentration of 0.3 ppm with a frequency of 1%.

25399 **APTIC NO. 46794**

Prospero, Joseph M. and Toby N. Carlson

VERTICAL AND AREAL DISTRIBUTION OF SAHARAN DUST OVER THE WESTEREN EQUATORIAL NORTH ATLANTIC OCEAN.

J. Geophys. Res., 77(27):5255-5265, Sept. 20, 1972. 22 refs.

Aerosol measurements were made as a part of the Barbados Oceanographic and Meteorological Experiment during May, June, and July, 1969. Maximum dust concentrations occurred between the altitudes of 1.5 and 3.7 km, a region which is called the Saharan air layer. The average concentration of mineral aerosol within this layer was 61 micrograms/cu m; in contrast, the average concentration in the low level air was 22 micrograms/cu m. These dust concentrations were comparable to those found in continental surface air. Because of the presence of a strong inversion at the base of the Saharan layer, sea salt was confined to the lower altitudes where the average concentration was 10 micrograms/cu m. Thus, sea salt appears to be a relatively minor constituent of the trade wind aerosol during much of the year. On the basis of these measurements and of a model describing the movement of Saharan air outbreaks, 25 to 37 million tons of dust are estimated to be transported through the longitude of Barbados each year. This quantity of dust is sufficient to supply all the material required to maintain the present rate of pelagic sedimentation across the entire northern equatorial Atlantic Ocean. (Author abstract modified)

25400 **APTIC NO. 46403**

Rodhe, Henning

MEASUREMENTS OF SULFUR IN THE FREE ATMOSPHERE OVER SWEDEN 1969-1970.

J. Geophys. Res., 77(24):4494-4499, Aug. 20, 1972. 12 refs.

The atmospheric content of sulfur (sulfur dioxide and sulfate on particulate matter) over a rural area in southern Sweden was measured during 30 airplane flights at four to eight different altitudes up to 3 km. Most of the sulfur was in the form of SO2. Mean values of concentrations of both SO2 and sulfate decreased by a factor of two from the ground up to 3 km. Although the data were scattered, systematic seasonal variations (with a minimum in summer) and dependence on static stability were demonstrated. The observed relation between SO2 and sulfate concentrations and the rate of decrease of SO2 with height indicate that the mean turnover time for SO2 before oxidation was at least of the order of tens of hours in this area. (Author abstract modified)

25401 **APTIC NO. 46631**

Rosen, James M.

THE STRATOSPHERIC AEROSOL BACKGROUND.

Preprint, American Meteorological Society, Boston, Mass., p. 205-208, 1972. 13 refs. (Presented at the International Conference on Aerospace and Aeronautical Meteorology, Washington, D. C., May 22-26, 1972.)

Aspects of stratospheric aerosols are reviewed, including condensation nuclei, monitoring programs, and present trends. At present, adequate long-range data are lacking that would indicate whether or not the concentration of stratospheric dust measured during the last few years represents a normal background or a disturbed condition. Natural fluctuations may be so large that an aerosol background is difficult, if not impossible, to define. Recommendations are made with regard to needed research projects.

25402 ***APTIC NO. 46399***

Shlanta, A. and C. B. Moore

OZONE AND POINT DISCHARGE MEASUREMENTS UNDER THUNDERCLOUDS. J. Geophys. Res., 77(24):4500-4510, Aug. 20, 1972. 24 refs.

Short duration increases in atmospheric ozone concentrations were observed beneath active New Mexican thunderstorms in the vicinity of an exposed and grounded sharp metal rod, using a chemiluminescent ozone meter. These ozone transients followed the emission of charge into the air from the metal point under the influence of atmospheric electricity. The increases were greater when they were associated with negative charge emission than when associated with positive; the maximum ozone concentration above lightning-induced emission of negative charge was about 6.4 times that of the fine weather concentration (about six ozone molecules per 100 million air molecules). Longer duration increases in the atmospheric ozone to about 1.5 times the prestorm concentration were found above a collection of natural grass points when overhead clouds were electrified with a net positive charge. Comparison of the ultraviolet radiation pulses from negative and positive point to plane discharges suggests a photochemical explanation for the relatively large production of ozone by negative charge emission. While much of the ozone appeared to have been transported by updrafts from the surface, the concentrations in an electrified cloud were greater than those near the earth. Ozone was produced by the point discharge from the surfaces of water droplets under intense electric fields; this process may account for some of the ozone observed in thunderclouds. (Author abstract modified)

25403 **APTIC NO. 46803**

Simpson, H. J.

AEROSOL CATIONS AT MAUNA LOA OBSERVATORY. *J. Geophys. Res., 77(27):5266-5277, Sept. 20, 1972. 18 refs.*

Aerosol and precipitation samples collected 3.4 km above sea level on the Island of Hawaii have only 1% of the concentrations of sodium that samples collected at sea level have. This difference suggests a short residence time for marine aerosols moving up the slopes of Mauna Loa. The major increase in the bulk chemistry of potassium, calcium, and magnesium relative to sodium occurs during the rapid loss of the first 90% of the aerosol mass. The chemistry of the remaining fractionated aerosols resembles that of Hawaiian rain. A second population of aerosols, with substantially lower sodium concentrations than fractionated marine aerosols, is present above the trade wind inversion. The major cation chemistry of these aerosols resembles that of continental rain. (Author abstract)

25404 **APTIC NO. 46833**

Smith, Robert S.

CONTROL STACK GAS POLLUTION. *Hydrocarbon Process., 51(9): 223-225, Sept. 1972. 4 refs.*

Proposed regulations for sulfur emissions require modification to most existing sulfur recovery plants and new design concepts for future plants. Design and operation of plans to meet ground level concentration requirements make it necessary to thoroughly understand the factors controlling these concentrations. An examination of these factors for a typical Claus unit is considered. Meteorological and dispersion factors are included, as well as plant size and stack height.

25405 **APTIC NO. 46604**

Sugano, Saburo, Yoshio Saiki, and Shinji Wakamatsu

AIR POLLUTION CAUSED BY PHOTOCHEMICAL REACTION IN VARIOUS AREAS - KANAGAWA PREFECTURE. *(Kakuchi ni okeru kokagaku hanno ni yoru taiki osen no genjo - Kanagawa-ken). Text in Japanese. Japan Society of Air Pollution, Proc. Japan Soc. Air Pollut., Meet. Air Pollut. Caused Photochem. Reaction, 1972, p. 223-230.*

Photochemical smog formation and the control policy adopted by Kanagawa Prefecture were described. During 1971, there were about 13,000 individuals who suffered injuries from air pollution. The symptoms included eye irritation, headache, and chest pain. The injuries occurred mainly in areas which had main streets and industries. Fifty air pollution detecting centers were distributed throughout the Prefecture for monitoring, forecasting, and issuing warnings. The highest oxidant concentration recorded was 0.28 ppm. The first degree warning was issued when the hourly average concentration reached 0.15 ppm and there were signs of the possibility of the continuation. The second degree warning was issued when the hourly average concentration reached 0.30 ppm. Air quality measurements were taken of sulfur dioxide, nitric oxide, nitrogen oxide, and oxidants.

25406 **APTIC NO. 46764**

Szepesi, D.

METHOD OF DETERMINATION OF AVERAGE IMPURITY CONCENTRATION NEAR AN ELECTRIC POWER PLANT BY MEANS OF AN ELECTRONIC COMPUTER. *In: American Institute of Crop Ecology Survey of USSR Air Pollution Literature. Technical Papers from the Leningrad International Symposium on the Meteorological Aspects of Atmospheric Pollution. Part I. M. Y. Nuttonson (ed.), Vol. 12, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 25-30. 8 refs. Translated from Russian. (Also: Meteorologisheski Aspekty Zagryazneniya Atmosfery, Leningrad, USSR, July 1968, p. 31-36.)*

NTIS: PB 210381

When calculating emissions due to power plants, it is not enough to know only the prevailing wind direction, for the dispersal of atmospheric pollutants also depends upon the frequency of wind velocities and directions, characteristics of the wind profile, and stability conditions. A mathematical model representing these meteorological factors is presented utilizing the Sutton formula, with effective source height being determined from Holland's formula. On the basis of anemometric and radiosonde observations, atmospheric stability and other factors necessary for the calculation of wind characteristics are determined. The data were used to find the dependence of the vertical dispersion parameter on atmospheric stability and distance from the source. The proposed model was used to calculate sulfur dioxide concentrations with regard to the expansion of a steam power plant in the area of Szazhalombatta, Hungary.

25407 **APTIC NO. 46811**

Twomey, S.

THE EFFECT OF CLOUD SCATTERING ON THE ABSORPTION OF SOLAR RADIATION BY ATMOSPHERIC DUST. *J. Atmospheric Sci., 29(6):1156-1159, Sept. 1972. 10 refs.*

When non-absorbing scatterers such as cloud drops are added in an absorbing layer such as a dust layer, the optical paths of the radiation will be greatly changed if the scattering component is optically thick. The absorption will thus be altered. Results are given of numerical computations to determine the effect of non-absorbing cloud drops on the absorption of radiation by a dust layer. Absorption decreases for low angles of incidence and increases for higher angles of incidence. (Author abstract modified)

25408 **APTIC NO. 46772**

Vasil chencko, I. V. and P. A. Vorontsov

TURBULENCE IN THE LOWER 500 M LAYER AND DIFFUSION OF IMPURITIES. *In: American Institute of Crop Ecology Survey of USSR Air Pollution Literature. Technical Papers from the Leningrad International Symposium on Meteorological Aspects of Atmospheric Pollution. Part I. M. Y. Nuttonson (ed.), Vol. 12, Silver Spring,* *Md., American Institute of Crop Ecology, 1972, p. 99-109. 8 refs. Translated from Russian. (Also: Meteorologisheskie Aspekty Zagryazneniya Atmosfery, Leningrad, USSR, July 1968, p. 99-108.)*

NTIS: PB 210381

Utilizing balloon, helicopter, and aircraft soundings, atmospheric turbulence in the lower 500 m layer was investigated. Temperature, humidity, pressure, wind velocity, and its longitudinal and vertical pulsations were measured, as well as the overloads experienced by the aircraft or helicopter at different levels over the underlying surface. The data obtained permits calculations to be made of various quantities characterizing air flow structure and turbulence intensity, in addition to computations of the components of a turbulent energy balance equation. The turbulence coefficient value depends, on the whole, on wind welocity, thermodynamical stratification, toughness of the underlying surface, terrain orography, and averaging period. Diurnal considerations are discussed, as well as sources of turbulence.

25409 **APTIC NO. 46445**

Wippermann, F. and D. Yordanov

LAYERS WITH A REDUCED EDDY VISCOSITY CAUSED BY THE BAROCLINICITY. *Beitr Physik Atmosphaere, 45(3):267-275, 1972. 8 refs.*

Investigations with a model of the planetary boundary layer showed that certain baroclinicities cause a minimum in the vertical profile of the Reynold s stress. Such a minimum occurs together with one in the vertical profile of the eddy viscosity. The height at which it occurs and the rate by which the eddy viscosity is reduced, depend on the direction and on the value of the thermal wind as well as on the thermal stratification. Numerical integrations were made with the planetary boundary layer model. The influence of thermal stratification was investigated with cold air advection and with thermal wind parallel to the surface wind. The universal profiles of the potential temperature were also computed.

25410 **APTIC NO. 46873**

Wisner, Chester, H. D. Orville, and Carol Myers

A NUMERICAL MODEL OF A HAIL-BEARING CLOUD. *J. Atmospheric Sci., 29(6):1166-1181, Sept. 1972. 32 refs.*

A numerical model of a hail-bearing cumulus cloud is presented. The model is one-dimensional and time-dependent, and it employs extensive parameterization of the microphysical processes. The raindrop and hailstone size distributions are assumed to be exponential at all times. Cloud droplets are converted to raindrops according to Berry s parameterization of the autoconversion process and are accreted by the raindrops according to Kessler s formulation. Raindrops are frozen at a rate consistent with Bigg s freezing equation, and the hailstones so formed then accrete raindrops and cloud droplets. Ice crystals are not allowed by the model, and for consistency, then, it is assumed that the cloud droplets do not freeze except when accreted by hailstones at temperatures less than 0 C. The melting and evaporation processes are modeled, and their impact on the results is explored. The results of five test cases are presented. The sequence of cases is designed to illustrate the effects of the presence of hail, the melting process, and the evaporation of rain on the model by eliminating them, one at a time, from the complete model. The effect of a lower limit on the cloud radius is briefly examined as it pertains to the entrainment process. (Author abstract modified)

25411 **APTIC NO. 46988**

Yoshikawa, Akira, Katsuto Yamaguchi, and Yoshio Inoue

FLOW OF HEAVY GAS DISCHARGED FROM OPEN CHANNEL (1). *(Kaikonai no omoi gasu no ryudo). Text in Japanese. Kuki Chowa Eisei Kogaku (J. Soc. Heating, Air Conditioning Sanitary Engrs.), 46(10):923-930, Oct. 1972. 3 refs.*

In order to find out dispersion behavior in the atmosphere of a gas heavier than air and its density distribution, an experiment was conducted in which carbon dioxide was constantly discharged at a fixed amount from the slit provided in one end of an open channel, thereby observing the vertical distribution of the gas density and effects of the gas discharge amount and channel length on the on-floor density and dispersion width affecting the vertical density distribution. The density distribution in the vertical direction could be expressed by a theoretical formula derived from a functional expression of velocity distribution of the laminar wall jet. This curve could be approximated by means of an expression similar to the Gaussian function of error. The theoretical formula is specifically governed by two variables, d (delta) and Cw, where d is value of y (cm) making C (density)/CW (on-floor density) equal to 0.5 and y is the vertical coordinate (cm). In a given section, the height at which the value of density becomes half that of one-floor density does not vary along the lengthwise direction of the open channel and can be expressed as function of only the open channel length and the gas discharge volume. The on-floor density decreases exponentially function-wise in the lengthwise direction of the channel. An empirical formula was established, and the value obtained was compared with the actually measured values to find its high applicability.

25412 **APTIC NO. 46595**

Yutani, Satoshi

ON MODELS AND MODELING OF PHOTOCHEMICAL SMOG. *(Kokagaku sumoggu no moderu to moderuka ni tsuite). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 8(9):821-827, Sept. 1972. 17 refs.*

The method of making various types of models and simulations are explained mathematically. The discussion includes simulations of traffic flow, meteorologic conditions, transportation conditions, and statistical systems. In dealing with photochemical reactions, the pollution sources are handled as surface sources and the area is divided on a map into lattice sections. The quantity of automotive exhaust in each section is calculated by the total length of roads, widths, the amount of traffic, conditions of signals, and the speeds and accelerations of cars. Simulation of meteorologic conditions are examined from the standpoint of general meteorology, mesoscale weather, and characteristically urban climates. There is a complex and uneven temperature distribution in the upper sky of cities, and heat islands and cool islands of air masses exist. Such phenomena as special rising current, descending current, and bundling of current and turbulence appear, and accordingly, predictions of the distribution of pollutants is not possible by the normal procedure of dispersion calculation. The modeling of such conditions can only be achieved by repeated observation and simulation calculations. Various published methods of modeling are briefly reviewed.

1971

25413 **APTIC NO. 46513**

Bach, Wilfrid, Barry Root, and Anders Daniels

THE USE OF CLIMATOLOGICAL PREDICTION MODELS FOR INDUSTRIAL AIR RESOURCES MANAGEMENT. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 20-26. 6 refs. (Dec. 7-10.)*

NTIS: CONF-711210

One tool that could be used to good advantage by both the agencies writing the states implementation plans and the industries that will be legally required to comply with the regulations they set forth is the climatological prediction model. Ground level isopleths of sulfur dioxide concentration in the vicinity of an oil refinery in Hawaii were calculated and compared using both the standard 22.5 deg sector model and a 1 deg sector model for both arithmetic and harmonic mean wind values. It is sometimes necessary in refinery operations to flare excess sulfur; if such activities must be conducted it is vital that they be done at a time when diffusion of pollutants is likely to be the greatest. Other managerial uses for the model are mentioned. (Author introduction modified)

25414 **APTIC NO. 46907**

Belugina, V. A., N. S. Burenin, P. I. Velikaya, and B. B. Goroshko

STUDYING THE DIFFUSION OF ATMOSPHERIC POLLUTANTS IN HIGH EMISSION SOURCE REGIONS. *(Issledovaniye rasprostraneniya vrednykh primesey v rayone vysokikh istochnikov vybrosa). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 254:82-86, 1971. 10 refs.*

Results of pollutant concentration field calculations with measurements of the actual sulfur dioxide, dust, and nitrogen oxides concentrations at distances of 1 to 15 km around two 180 and 250 m high stacks of a thermal power plant were compared. Good agreement between calculated and measured values for both SO2 and dust was observed, while the actual concentrations were somewhat higher than the calculated. The difference between the maximum calculated and measured SO2 concentrations at 5 km was only 7%, while low emission sources at shorter distances resulted in greater differences. The differences between the calculated and measured dust concentrations were greater than that for SO2, with a value of 20% for the maximum concentrations. The differences also grew with increasing distance from the source. The SO2 concentrations measured at 1 to 5 km from the sources increased with wind speeds up to 4-5 m/sec, where a maximum was followed by further decline. The nitrogen oxide concentrations were about 1/7th of the corresponding SO2 levels.

25415 **APTIC NO. 46519**

Beran, D. W., F. F. Hall, Jr., J. W. Wescott, and W. D. Neff

APPLICATION OF AN ACOUSTIC SOUNDER TO AIR POLLUTION MONITORING. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 66-72. 14 refs. (Dec. 7-10.)*

NTIS: CONF-711210

While the temperature lapse rate is of prime concern in air pollution meteorology, secondary, and at times equally important, effects can be attributed to the wind pattern over a city. Wind direction plays an important role in determining the path pollutants will take after emission. In addition, strength of the wind is important in determining how rapidly effluents will be carried away--a necessary input when determining if a given emission rate will produce critical concentration levels over a region. Other meteorological parameters, such as the presence of humidity and solar radiation, are important, but to a lesser degree. A relatively new device, the Acoustic Echo Sounder, can collect continuous mesoscale measurements in critical regions at a cost significantly below other proposed methods. The theory of acoustic sounding is discussed, and results are presented from recent field tests which demonstrate the potential of the device for measuring wind and temperature structure. Problems related to operating in the urban environment under all types of conditions are covered. (Author introduction modified)

25416 **APTIC NO. 46527**

Chang, P. C., P. N. Wang, and A. Lin

TURBULENT DIFFUSION IN A CITY STREET. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 137-144. 12 refs. (Dec. 7-10.)*

NTIS: CONF-711210

Circulation and diffusion in a city street were investigated through a laboratory and computer simulation study by considering transverse wind over a simplified city street, i.e., a rectangular trough. As a transverse wind flows over a city street, the oncoming wind separates from the edge of upstream roof and forms a recirculating cavity flow in the street depression. The recirculating cavity which is separated from the ambient wind through a free shear layer generates a thin boundary layer along the street surface and building walls. The whole entity of cavity flow obviously depends upon the geometry of the trough and the parameters of the oncoming boundary layer, e.g., boundary layer thickness and level of turbulence intensity. The resulting different scales of air motion dictate the air pollution in city streets; the recirculating cavity flow transports and distributes the pollutants in the street trough and the turbulent motion in the free shear layer provides a mixing process to diffuse them to the external flow. Aerodynamic characteristics of flow in the rectangular trough and over the trough are presented, and diffusion from the ground source is considered.

25417 **APTIC NO. 46517**

Collis, R. T. H.

LIDAR OBSERVATIONS IN TURBULENCE AND DIFFUSION STUDIES. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 50-55. 8 refs. (Dec. 7-10.)*

NTIS: CONF-711210

The lidar technique of remotely mapping and tracking subvisible concentrations of particulates can be of considerable value in turbulence and diffusion studies. By revealing variations in the vertical distribution of the natural aerosol it provides information on the stability of the lower atmosphere and its changes with time. Lidar observations can show the motion and dispersal of smoke, making it possible to study transport and diffusion processes conveniently in three dimensions, even when the concentrations of the material are too low to be seen or photographed. The basic lidar concept, lidar observations, applications in research studies, observations of smoke stack plumes, and observations of urban aerosol structure are considered. (Author introduction modified)

25418 **APTIC NO. 46528**

Dabberdt, Walter F., F. L. Ludwig, and Warren B. Johnson

URBAN DIFFUSION OF CARBON MONOXIDE. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 145-151. 9 refs. (Dec. 7-10.)*

NTIS: CONF-711210

Measurement programs and analyses are presented which were used to test and improve a diffusion model previously developed. The model, based on existing experimental data and previous research results, is a receptor-oriented Gaussian diffusion model and is designed to calculate carbon monoxide concentrations from routinely available traffic and meteorological data. Model predictions were initially compared with measured data from Continuous Air Monitoring Program stations; calculated and observed values often differed significantly in magnitude, although they showed similar trends. An extensive field program in San Jose, California, showed that these differences are primarily the result of local effects in the street canyons and around buildings that can sometimes cause carbon monoxide concentrations to vary by as much as a factor of three from one side of the street to the other. The basic model failed to predict observed concentrations accurately partly because it treated the diffusion process only on the urban mesoscale, whereas concentrations observed at monitoring locations may reflect two predominant scales of motion: the urban mesoscale and the street microscale. A new submodel was developed that describes the microscale effects. (Author introduction modified)

25419 **APTIC NO. 46529**

Danard, Maurice B., Rao S. Koneru, and Peter R. Slawson

A NUMERICAL MODEL FOR CARBON MONOXIDE CONCENTRATIONS NEAR A HIGHWAY. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 152-157. 6 refs. (Dec. 7-10.)*

NTIS: CONF-711210

The design and testing are described of a numerical model to compute carbon monoxide concentrations in a vertical plane orthogonal to Highway 401 at Keele St. in Toronto, Canada. The approach is to integrate in time the non-steady two-dimensional diffusion equation. Diffusivities vary both horizontally and vertically. Winds vary in the vertical. The highway is treated as an area source. On the upwind boundary, concentrations are assumed to be zero. Starting from zero initial concentrations, computations are continued until the efflux from the downwind boundary is equal to the influx from the highway. Wind speeds are assumed to vary logarithimically with height below 10 m and linearly above this level. The roughness length is taken as 1 m. Larger diffusivities are employed over the highway in the lowest 3 m than to the sides. Above 10 m the diffusivity is greater for cold air advection than for warm. Mixing heights and upper winds are computed using upper air data at Buffalo, New York. Winds at 10 m and surface temperatures are assumed to be the same as at the Toronto airport. (Author introduction modified)

25420 **APTIC NO. 46523**

Daniels, Anders

MANDEL SHTAM-BRILLOUIN SCATTERING OF LASER LIGHT AS A REMOTE SENSING TOOL. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 100-107. 12 refs. (Dec. 7-10.)*

NTIS: CONF-711210

One approach to the remote sensing of atmospheric parameters is to determine the frequency spectrum of returned laser radiation, since the difference in velocity between molecules and aerosols should separate the return signal when viewed in frequency space; with this technique the temperature of the medium could also be inferred from the frequency distribution of the light scattered by molecules. This distribution should exhibit a broadening characteristic of molecules moving according to a Maxwellian velocity distribution. While it has been suggested that the carbon dioxide laser would be the best choice for an experiment to verify this theory, if one uses a CO_2 laser with a wavelength of 10.6 micron, the individual molecules will not act as scatters of the laser light since here the light wavelength is two orders of magnitude larger than the mean free path of the molecules. In this case the scattering will no longer be produced by individual molecules, but from larger random density fluctuations in the medium. This theory of scattering--known as Mandel shtam-Brillouin scattering--is summarized and interpreted in terms of meteorological parameters. An experiment which verifies the theory is described. (Author introduction modified)

25421 **APTIC NO. 46514**

Djuric, D. and J. C. Thomas

A NUMERICAL STUDY OF CONVECTIVE TRANSPORT OF A GASEOUS AIR POLLUTANT IN THE VICINITY OF TALL BUILDINGS. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 27-34. 12 refs. (Dec. 7-10.)*

NTIS: CONF-711210

With the advent of larger and faster computers it is becoming feasible to solve transport and diffusion equations under more complicated conditions than previously attained. The flow around buildings of various shapes is geometrically complicated, but can be simulated in a three-dimensional model. A numerical model which simulated fluid motion and pollutant diffusion for the region of downtown Houston during 36 minutes of actual time is considered.

25422 **APTIC NO. 46515**

Hotchkiss, Robert S.

THE NUMERICAL CALCULATION OF THREE-DIMENSIONAL FLOWS OF AIR AND PARTICULATES ABOUT STRUCTURES. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 35-42. 5 refs. (Dec. 7-10.)*

NTIS: CONF-711210

A computer program capable of solving the time dependent, three-dimensional equations governing fluid motions greatly distorted by structures is described. The method employs finite differences to solve the full nonlinear Navier-Stokes equations for incompressible flows with buoyancy. In addition, heat and particulate transport equations are solved. Two particulate transport models are described: one involves the solution of a transient concentration equation for pure convection and diffusion, while in the second model a dynamic equation that includes Stokes drag, gravity, and diffusion is solved for each particle. In both cases particulate settling is allowed to occur. Results of calculations are displayed as three-dimensional perspective views drawn by standard computer hardware. Newly developed techniques for computerizing these perspective views are described. Two adjacent perspective views are used to enable the viewer to see in stereo. To establish the validity of the particulate transport calculations, results are presented for a comparison of the numerical calculation of a symmetric plume to the standard analytical model. (Author introduction modified)

25423 **APTIC NO. 46537**

Ide, Yasuo

PREDICTION OF LATERAL DIFFUSION BY TURBULENT THEORY. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 340-351. 10 refs. (Dec. 7-10.)*

NTIS: CONF-711210

A method for predicting lateral diffusion of a quasi-steady plume is formulated by applying Inoue's turbulon theory to the author's quasi-steady diffusion theory. The main predictor for lateral diffusion is either energy dissipation or Eulerian turbulent energy. Making use of previously reported data, experimental verification of this method is also considered.

25424 **APTIC NO. 46530**

Justus, C. G. and J. E. Hicks

MODELING THE ANISOTROPY IN STRATIFIED SHEAR FLOW. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 202-207. 5 refs. (Dec. 7-10.)*

NTIS: CONF-711210

A model for the study of turbulent diffusion is presented which is a three dimensional random walk of a fluid element or a fluid element pair which moves according to an acceleration equation. Some typical results of the diffusion of a fluid element pair are shown, where the mean square separation is plotted versus time. In view of the distinctly different character of the diffusion in the various component directions, it appears that the plume type of dispersion models in current use could be improved upon considerably by a model which would reflect the major anisotropy features revealed here.

25425 **APTIC NO. 46520**

Klainer, Stanley M. and Elliot R. Schildkraut

THE USE OF REMOTE RAMAN SPECTROMETRIC TECHNIQUES IN METEOROLOGICAL DIFFUSION

STUDIES. New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 73-79. (Dec. 7-10.)

NTIS: CONF-711210

Applicability of the remote Raman spectrometer to meteorological diffusion studies is being evaluated. Advantages of the technique are the simplicity of data interpretation and the ability to present three-dimensional data in absolute concentration. To date, tracer compounds have been selected and the detectability have been determined in the atmosphere as a function of concentration and distance from the Raman instrument. Classical Raman spectroscopy and the remote Raman spectrometer are considered, including instrument specifications, instrument sensitivity, determination of a sample concentration, spectral considerations, and detection limits of tracer materials.

25426 **APTIC NO. 46538**

Lamb, Robert G.

THE APPLICATION OF A GENERALIZED LAGRANGIAN DIFFUSION MODEL TO AIR POLLUTION SIMULATION STUDIES. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 352-359. 6 refs. (Dec. 7-10.)*

NTIS: CONF-711210

Techniques for describing the statistical properties of concentrations of marked particles, such as air pollutants, in a turbulent fluid can be divided into two broad categories -- Lagrangian and Eulerian. Eulerian methods attempt to formulate the concentration statistics in terms of the statistical properties of Eulerian fluid velocities, i.e., the velocities measured at fixed points in the fluid. Lagrangian techniques attempt to describe the concentration statistics in terms of the statistical properties of displacements of groups of particles released in the fluid. The mathematics of this approach are much more tractable than those of the Eulerian methods -- no closure problem is encountered but the applicability of the resulting equations is somewhat limited due to the difficulty of accurately determining the required particle statistics. Moreover, the equations are not directly applicable to problems involving non-linear chemistry, such as the simulation of photochemical smog. An equation which shows how the complete statistical properties of the concentrations and the displacements of the marked particles are related is presented, then modified to handle problems involving certain types of chemical reactions. Applicability of the resulting equation to actual atmospheric diffusion studies is considered.

25427 **APTIC NO. 46516**

Lantz, R. B., K. H. Coats, and C. V. Kloepfer

A THREE-DIMENSIONAL NUMERICAL MODEL FOR CALCULATING THE SPREAD AND DILUTION OF AIR POLLUTANTS. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 43-49. 13 refs. (Dec. 7-10.)*

NTIS: CONF-711210

A three-dimension numerical model is described for calculating the movement and dilution of a pollutant emitted into the air. The technique includes modification of the three-dimensional wind field for flow over topographical features and around buildings. Simple chemical reaction and removal by ground adsorption are included in the material balance on pollutant. Computing times based upon a CDC 6600 for a large 7000 grid block system range from less than half a minute for a steady-state problem with no terrain feature to ten minutes or more for a complex transient problem. Turbulent diffusion, plume rise, calculations for a large urban area, and comparisons with wind tunnel tests are also described. (Author conclusions modified)

25428 **APTIC NO. 46787**

Lavrinenko, R. F.

ON THE REGULARITIES IN THE VARIATION OF THE ATMOSPHERIC PRECIPITATION PH. *(O zakonomernostyakh izmeneniya pH v atmosfernykh osadkakh). Text in Russian. Tr. Glav. Geofiz. Observ. (Leningrad), no. 254:184-189, 1971. 7 refs.*

Snow and rain samples from the Leningrad region were analyzed to determine regularities in the variation of the precipitation pH values, and the effects of industrial and urban emissions. The equilibrium pH value of 5.5-5.8 corresponds to precipitation with minimal mineral content, from a non-polluted atmosphere. Ammonium and sulfate ions, whose concentrations were related to monobasic ammonium sulfate or ammonium sulfate, prevailed in most acid precipitation samples. Calcium, magnesium, and ions, originating from ash and soil particles, are mainly responsible for the basicity of the precipitation. Precipitation falling in the presence of acid and alkaline components simultaneously may be basic, slightly acid, or neutral, depending on relations between the soluble fractions of such components. Many snow samples, mostly falling under stable stratification conditions, contained fairly high amounts of impurities, but also very pure samples were encountered. The average pH values of summer precipitation in Leningrad and in one of its suburbs were 5.28 and 5.38, and those of winter precipitation were 6.61 and 5.69, respectively.

25429 **APTIC NO. 46524**

McElroy, James L.

A NUMERICAL MODEL OF THE NOCTURNAL URBAN BOUNDARY LAYER. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 116-121. 15 refs. (Dec. 7-10.)*

NTIS: CONF-711210

The structure of the atmosphere over cities differs most significantly from that over adjacent rural areas during the nocturnal period when the heat island phenomenon usually is developed to its maximum extent. The difference primarily should be the result of momentum fluxes due to the enhanced roughness of the urban surface and heat fluxes due to the varying thermal characteristics of the urban surface and the production of artificial heat from the activities of man. A model of the urban heat island was developed from a one-dimensional, time dependent boundary layer model of Estoque. The model is two-dimensional and is solved numerically on a digital computer. The primary modification to the basic model of Estoque consists of replacing the local time derivatives by total or Lagrangian time derivatives. Other differences between the two models are indicated, as well as model parameters and data input for Columbus, Ohio, and comparisons between numerical simulations and Columbus data. (Author introduction modified)

25430 **APTIC NO. 46535**

Michael, Paul

COMPUTATIONAL EVALUATION OF THE GAUSSIAN PLUME MODEL. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 318-322. 11 refs. (Dec. 7-10.)*

NTIS: CONF-711210

Dispersion calculations are most frequently performed by means of the Gaussian plume model. More important than the assumption of normality in the horizontal and vertical is the assumption that the proper selection of parameters will allow for the proper computation of the concentration of a pollutant of interest. Some of these assumptions were evaluated by obtaining K theory solutions for presuppositions concerning such parameters as wind and diffusivity profiles, then finding parameters of the Gaussian plume model to match these solutions.

25431 **APTIC NO. 46526**

Nicholson, Bruce and George White, III

AIR POLLUTION EFFECTS ON VISIBILITY IN THE NON-URBAN ENVIRONMENT. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 130-136. 7 refs. (Dec. 7-10.)*

NTIS: CONF-711210

The first step in estimating the effects of air pollution on visibility in a general non-urban environment is to be able to estimate the concentration of pollutants downwind from various types of sources. Modified to take into account ground deposition, plant uptake, and plume reactions, the Pasquill-Gifford Gaussian distribution model is presented. In general, the number of particulates in each size range, the size range found, the type of particle (index of refraction), and for absorbing gas, the type of gas, are necessary information to evaluate the effects of visibility. Visual range versus meteorological visibility, measuring visual range, and visibility standards are considered.

25432 **APTIC NO. 46783**

Petrenchuk, O. P. and V. M. Drozdova

SULFUR DIOXIDE DETERMINATIONS IN THE FREE AIR: SOME RESULTS. *(Nekotoryye rezul taty opredeleniya kontsentratsii sernistogo gaza v svobodnoy atmosfere). Text in Russian. Tr. Glav. Geofiz. Observ. (Leningrad), no. 254:178-183, 1971. 11 refs.*

Sulfur dioxide concentration profiles in the lower 2600-meter layer of the atmosphere over an industrial urban area in the northwestern European USSR territory were determined. Considerable increase in the SO2 concentration beneath the inversion layer in an anticyclone was revealed. Such concentration peaks were usually accompanied by temperature inversions. The ground-level SO2 concentrations under intense turbulent exchange conditions were lower than during an anticyclone, and only minor decrease in the SO2 levels up to an altitude of 2600 m was observed, which suggests nearly homogeneous distribution of the SO2 in the atmosphere under such meteorological conditions.

25433 **APTIC NO. 46533**

Putta, S. N. and J. E. Cermak

DIFFUSION FROM AN INSTANTANEOUS LINE SOURCE IN THE ATMOSPHERIC SURFACE LAYER. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 302-310. 14 refs. (Dec. 7-10.)*

NTIS: CONF-711210

A study was undertaken to determine the statistical properties of a dispersing cloud and to construct a probability density function for the concentration of the passive material released instantaneously at ground level from a crosswind line source. The concept of Lagrangian similarity theory is assumed to be applicable and the theory of moment transformation is utilized. The flow is assumed to be neutrally stratified and fully developed. The surface is assumed to be uniformly rough and it is assumed that the vertical velocity distribution is logarithmic.

25434 **APTIC NO. 46536**

Ramsdell, J. V.

CONCENTRATION FLUCTUATION AND PEAK-TO-MEAN CONCENTRATION RATIOS IN REAL PLUMES. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut. Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 323-330. 11 refs. (Dec. 7-10.)*

NTIS: CONF-711210

Experimental insight into the concentration fluctuations associated with real plumes was provided by a series of diffusion tests conducted at Hanford. These concentration fluctuations can be ascribed in part to the meandering of the instantaneous plume and in part to random variations of the concentration within the instantaneous plume. The magnitude of the fluctuations and the systematic ways in which they vary are described.

25435 **APTIC NO. 46518**

Snider, J. B.

RECENT RESULTS IN GROUND-BASED SENSING OF ATMOSPHERIC TEMPERATURE PROFILES. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 56-65. 4 refs. (Dec. 7-10.)*

NTIS: CONF-711210

The application of ground-based radiometric measurements of emission from atmospheric oxygen to the problem of estimating the variation of temperature with height is discussed in recent literature. In the majority of measurements reported, temperature profiles were determined by inverting single frequency measurements of brightness temperature as a function of elevation angle. An alternate technique consists of inverting observations of brightness temperature as a function of frequency at either a fixed or variable elevation angle. Instrumentation was developed to permit experimental evaluation of both techniques, and an experiment was performed to compare quantitatively the relative merits of the two techniques. A combination of angular scan and multi-spectral data produced more accurate data than other input data combinations. The angular scan method was superior to multi-spectral techniques especially when detecting surface based temperature inversions. A two frequency-angular scan combination yielded results nearly as good as those obtained with a four frequency angular scan combination.

25436 **APTIC NO. 46531**

Start, G. E., C. R. Dickson, and P. G. Voilleque

COMPARISONS AMONG TRACER, TETROON, AND WIND FIELD DERIVED TRAJECTORIES AND SOME DIFFUSION ESTIMATES. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 280-285. 9 refs. (Dec. 7-10.)*

NTIS: CONF-711210

The successful field implementation is described of a unique combination of complementary and valuable measurements which could be a useful technique for achieving a better understanding of a regional dispersion of airborne material. Methyl iodide tracer was released over a 65-minute period from the 76 m stack at the Idaho Chemical Processing Plant. The testing also included unique, simultaneous measurements of low level winds from an encompassing network tower of mounted wind sensors and trajectories from serially released tetroons. A form of the standard Gaussian plume model for a continuous point source was calculated. The tracer spreading behaved as expected. At longer distances in the presence of vertical shear of wind direction, the tetroon trajectories were the best indication of transport.

25437 **APTIC NO. 46534**

Thiebaux, Martial L.

WIENER-HERMITE EXPANSION APPLIED TO PASSIVE SCALAR DISPERSION IN A NONUNIFORM TURBULENT FLOW. II. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 311-317. 7 refs. (Dec. 7-10.)*

NTIS: CONF-711210

How inhomogeneous and nonstationary statistics describing a velocity field can be incorporated into the time evolution (integrodifferential) equation for the expectation value of the concentration in an ensemble of flows is demonstrated. In the absence of knowledge of high order velocity moments, some additional assumptions are required to establish rules that relate high order moments to low order ones, and it is shown that a truncated Wiener-Hermite expansion of the velocity field leads to such rules.

25438 **APTIC NO. 46539**

Tsang, Gee

OPTIMAL VELOCITY DISTRIBUTION AT INDUSTRIAL STACK EXIT. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 360-368. 2 refs. (Dec. 7-10.)*

NTIS: CONF-711210

The question is considered of whether plume rise and the chance of rising across an inversion by a plume can be increased by other means than tall chimneys and the addition of heat and momentum to the flue gases. The condition of air pollution at ground level can be improved by better preserving the temperature and velocity of the flue gases, which in turn, can be achieved by minimizing the entrainment of the ambient air into the plume. Using the entrainment hypothesis, equations are obtained which give the optimal size of the stack exit and the optimal velocity distribution at the stack exit. Laboratory experiments showed the theory to be workable. (Author conclusions modified)

25439 **APTIC NO. 46525**

Webb, Willis L.

A PROPOSED MESOMETEOROLOGICAL NETWORK FOR EL PASO. *New Mexico State Univ., Las Cruces, Proc. Symp. Air Pollut., Turbul. Diffus., Las Cruces, N. Mex., 1971, p. 122-129. 9 refs. (Dec. 7-10.)*

NTIS: CONF-711210

Mesometeorology refers to those dynamic aspects of atmospheric processes which have intermediate scales, smaller than the synoptic phenomena of common weather maps and larger than those parameters sampled at a local weather station. Included are small scale phenomena, such as drainage winds and lee waves generated by local terrain effects, and convective systems, such as thunderstorms and tornadoes. Past events of meteorological significance in the El Paso area are summarized, the state of knowledge of local atmospheric structure is illustrated, and the structure of a local meteorological observational system which will be adequate for control of future metropolitan growth is depicted. The mesonet model which is outlined incorporates use of a digital computer for collection, evaluation, storage, and presentation of the data and, where possible, involves automation of the sensors and telemetry systems to reduce manual operation to a minimum. To facilitate development of such a unified system of data storage, processing, and calculation for ecological purposes, a unique grid system for mesometeorological work is presented for the El Paso metropolitan area.

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25440 **APTIC NO. 46805**

Anderson, J. G. and F. Kaufman

KINETICS OF THE REACTION OH + NO2 + M YIELDS HNO3 + M. *Chem. Phys. Letters (Amsterdam), 16(2):375-379, Oct. 1, 1972. 14 refs.*

The reaction rate constant of the reaction (nitrogen dioxide + hydroxyl radical + argon yields nitric acid + argon) was measured over the pressure range of 0.5-10 torr at 297 K using ultraviolet fluorescent scattering for the detection of OH radicals. The OH reactions involving the nitrogen oxides may play a fundamental role in stratospheric pollution processes which are of direct relevance to the total ozone content of the upper atmosphere. Preliminary results for the (NO + OH + Ar yields HNO3 + Ar) reaction rate constant are considered. (Author abstract modified)

25441 **APTIC NO. 46682**

Bogomolov, V. I., N. V. Mirzabekova, Ya. I. Isakov, L. O. Golender, and Kh. M. Minachev

STUDY OF BENZENE AND CARBON MONOXIDE ADSORPTION ON ION-EXCHANGED FORMS OF ZEOLITE Y BY CHROMATOGRAPHIC METHOD. *(Issledovaniye adsorptsii benzola i okisi ugleroda na kationnykh modofikatsiyakh tseolita Y khromatograficheskim metodom). Text in Russian. Ser. Khim., no. 8:1697-1703, Aug. 1972. 26 refs.*

The heat of adsorption and the adsorption volume of benzene and carbon monoxide on calcium-, cadmium-, nickel-, neodymium-, and hydrogen-exchanged forms of Y type zeolite with a silica to aluminum oxide ratio of 5.0 and with different sodium contents were investigated by a chromatographic method. The adsorption of benzene in a temperature range of 300-500 C was determined by flame-ionization detector, and CO adsorption was done in a 100-180 C range for Cd-substituded and in a 30-90 C temperature range for Ni-, Ca-, Nd-, and H-substituted zeolite. The heat of adsorption and the adsorbed volume of CO and benzene increased when bivalent or trivalent cations were introduced. The rapid increase in the values of the heat of adsorption and of the adsorbed volume started earlier in the case of Ni than in the case of Ca and Cd. The heat of adsorption of CO was highest for the transition metals Ni and Cd at a maximum rate of Na substitution. The results obtained can be used for the determination of bivalent and trivalent cations in structual sections accessible for the molecules to be adsorbed, of the cation migration and of changes of the crystal lattice due to different modes of treatment and exploitation of the zeolite. Such studies on Ca2+ and Nd3+ forms are best made with benzene, while CO is the best adsorbate for studies of Cd2+ and Ni2+ forms.

25442 **APTIC NO. 47094**

Campbell, K. and J. M. Palmer

THE DETERMINATION OF TRACE AMOUNTS OF LEAD IN PETROLEUM PRODUCTS BY IODINE MONOCHLORIDE EXTRACTION AND ATOMIC ABSORPTION ANALYSIS. *J. Inst. Petrol. (London), 58(562):193-200, July 1972. 5 refs.*

An analytical method was developed for the determination of trace amounts of lead in petroleum. The lead is extracted from the petroleum product with iodine monochloride solution and then converted to a lead iodide complex. This is extracted into methyl isobutyl ketone, and the lead concentration is determined by atomic absorption analysis. The method is more rapid than and just as precise as the standard colorimetric procedure. (Author summary modified)

25443 **APTIC NO. 46717**

Chistyakov, A. D., V. F. Bagretsov, and O. I. Martynova

THE GENERAL DISTRIBUTION COEFFICIENT OF INORGANIC COMPOUNDS BETWEEN SATURATED STEAM AND WATER. *(Obshchiy koeffitsient raspredeleniya neorganicheskikh veshchestv mezhdu nasyshchennym parom i vodnymi rastvorami). Text in Russian. Teploenergetika, no. 8:62-63, 1972. 7 refs.*

Theoretical investigations of the general distribution coefficient of inorganic compounds between saturated steam and water are described with special regard to colloidally dispersed solid water contaminants. The contamination of the vapor phase with solid components of the water can be due only to priming in boiling water. The interphasic distribution of electrolytes in multi-component salt systems should be determined across the distribution of the analytically determinable system components such as sodium, calcium, nitrite, and sulfate ions. The equality of the electrochemical potentials of ions distributed between the electrically neutral water and vapor phases represents the condition for the equilibrium of the ions in these phases. Formula describing the general distribution coefficient of any component of the system as a function of the composition of the system and of the priming is given.

25444 **APTIC NO. 46456**

Davidson, James Arthur

THE PHOTOSENSITIZED PRODUCTION AND DEACTIVATION OF O2((1)SIGMA(+)SUB G). *Case Western Reserve Univ., Cleveland, Ohio, Dept. of Chemistry, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., Jan. 1972, 128p. 66 refs.*

Because of the possible involvement of singlet molecular oxygen, O2((1)Sigma(+)sub g) and O2((1)Delta sub g), in atmospheric photochemistry, the photosensitized formation of O2((1)Sigma(+)sub g) in the gas phase was investigated in this study. The production of O2((1)Sigma(+)sub g) upon flash photolysis of sensitizer -O2 mixtures was detected by the emission of O2((1)Sigma(+)sub g) at 7620 A. It was found that O2((1)Sigma(+)sub g) may be formed by energy transfer from benzene, naphthalene, octafluoronaphthalene, phenanthrene, benzaldehyde, biacetyl, and sulfur dioxide. The SO2-O2 system is of particular interest because of the potential importance of this system to atmospheric photochemistry. The sensitizing species in this system is probably SO2((3)Beta sub 1). This species is deactivated about five times more efficiently by SO2((1)Alpha sub 1) than by O2((3)Sigma(-)sub g). The rate constants for the quenching of the emission of O2((1)Sigma(+)sub g) at 7620 A by several added gases was also investigated. The following quenching rate constants (in l/m sec) were determined: carbon dioxide (250 million); SO2 (400,000); hydrogen (660 million); ethane (280 million); C2D6 (100 million); carbon tetrachloride (270,000); carbon disulfide (1.7 million); and C10H8 (560 million). On the basis of these determinations and previous studies a direct correlation is drawn between the vibrational frequency of the quencher and the quenching efficiency. (Author abstract)

25445 **APTIC NO. 46686**

Hauser, Thomas R., Thomas A. Hinners, and Jane L. Kent

ATOMIC ABSORPTION DETERMINATION OF CADMIUM AND LEAD IN WHOLE BLOOD BY A REAGENT-FREE METHOD. *Anal. Chem., 44(11):1819-1821, Sept. 1972. 12 refs.*

Cadmium and lead in trace quantities in the environment (air and water) has caused concern about the effects of metals on man. A method for the analysis of whole blood to detect cadmium and lead with relative detection limits of 0.2 ng/ml and 2 ng/ml, respectively, is examined. The apparatus, reagents, calibration, and experimental procedure are discussed. Whole blood was added to a flame-purged tantalum sampling boat, dried in an oven, and ashed in a low-temperaure asher. The ash was directly flamed in the atomic absorption spectrophotometer for analysis. Recovery of cadmium and lead from the spiked blood samples was complete. The method offers increased simplicity and ease of analysis in comparison to extraction procedures. (Author abstract modified)

25446 **APTIC NO. 46809**

Holding, S. T. and G. Williams

A RAPID CHEMICAL PROCEDURE FOR THE DETERMINATION OF TRACE LEAD CONTAMINATION IN NON-LEADED GASOLINES. *J. Inst. Petrol. (London), 58(562):230-236, July 1972. 6 refs.*

A simple rapid chemical method was developed for determining the lead content of a gasoline containing alkyl lead in the range of 1-20 mg/l. The procedure involves colorimetric determination of lead via the dithizone complex formed with partially cleaved lead alkyls produced by reaction of the gasoline sample with bromine. The main features of the technique are the controlled in situ generation of bromine to avoid hazards involved in handling a separate bromine solution; the elimination of any heating stage; and the use of tetraethylenepentamine in place of the usual potassium cyanide reagent to mask interference from certain other metals. A determination can be completed in less than 10 min, and the procedure can be readily adapted for field test use or for higher lead concentrations. (Author summary modified)

25447 **APTIC NO. 46431**

Ialamov, Iu. I., V. M. Aladzhian, V. S. Galoian, and B. V. Deriagin

DIFFUSIOPHORESIS OF VOLATILE AEROSOL PARTICLES IN THE REGIME WITH SLIP. *(Diffuzioforez letuchikh aerozol nykh chastits v rezhime so skol zheniyem). Text in Russian. Dokl. Akad. Nauk SSSR, 206(2):316-318, 1972. 10 refs.*

The mathematical derivation of the rate of diffusiophoresis of volatile particles of moderate size in a slip regime with respect to all factors involved in Knudsen s coefficient is presented. The derivation refers to a spherical droplet of a volatile substance, forming one component of a binary gaseous mixture. Formulae are given for the velocity and pressure around a droplet for a low Reynolds number, for the gas slip (gas-kinetic and diffusion slips) along the surface of the particle, the concentration jump of the volatile component on the surface of the particle, and for the absolute molecular concentration at infinity of the volatile component. A formula of the rate of diffusiophoresis for particles in uniform motion and zero total force is derived. An auxiliary effect, appearing as a result of the additional diffusion slip due to the concentration gradient at the particle surface, causes a shift towards decreased concentration of the volatile component. It was thus possible to determine the dependence of the rate of diffusiophoresis of volatile aerosol particles of moderate size on Knudsen s number by taking into account the concentration jump and the slip at the surface of the particle.

25448 **APTIC NO. 46901**

Kadura, Peter and Christian Opitz

QUANTUM-CHEMICAL INDICATION OF STRONGLY LOCALIZED CHEMISORPTION IN THE CO-IRON SYSTEM. *(Quantenchemischer Hinweis auf stark lokalisierte Chemisorption im System CO an Eisen). Text in German. Z. Physik Chemie (Leipzig), 250(3/4):168-176, 1972. 20 refs.*

Quantum-chemical investigations of a model for the chemisorption of carbon monoxide on iron (CO chemisorbed on a linear chain of a finite, n equals 10, number of Fe atoms) by means of the EHMO-approximation (Extended-Hueckel method by Hoffmann) method gave results indicating strongly localized bond of CO on the next Fe atom which is largely separated from the chain. With the chemisorption of CO on Fen being strongly localized, a small bond energy, in the order of magnitude of intramolecular forces, between the surface complex FeCO and Fen-1 remains. The result is in good agreement with the theory on the demetallization of surface atoms occurring at the onset of chemisorptive bond. The chemisorption of Fe on Fe represents a delocalized process, and, along with the chemisorption of CO on Fe, two extreme cases of chemisorption. The mechanism of the catalytic action of iron appears from this model as an interaction of an Fe atom, nearly released by the chemisorption process, with the adsorbate.

25449 **APTIC NO. 46432**

Kafarov, V. V., V. A. Reutskiy, and V. N. Sharifulin

A SIMPLIFIED METHOD FOR THE COMPUTATION OF THE CHEMICAL SORPTION ENHANCEMENT COEFFICIENT. *(Uproshchennyy rascset koeffitsienta uskoreniya protsessov khemosorptsii). Text in Russian. Zh. Prikl. Khim., 45(6):1382-1383, June 1972. 13 refs.*

A simple method of sufficient accuracy for the computation of the chemical sorption enhancement coefficient is described. The method, applying no itineration, is based on the principle of corresponding states, and uses a formula containing such terms as the enhancement coefficient for a second-order reaction of infinitely high rate, and another enhancement coefficient for a pseudo-first-order reaction. The method reduces the time requirement for the computation considerably. The computation is illustrated by an example. The maximum error is 3-5%. The computation is illustrated by an example of the chemisorption of carbon dioxide in a potassium hydroxide solution.

25450 **APTIC NO. 46806**

Kempter, V., J. Lorek, and T. K. Rai Dastidar

SEVERAL NEW FEATURES IN THE RADIATION OF EXCITED NO2 PRODUCED IN FAST COLLISIONS WITH NA ATOMS. *Chem. Phys. Letters (Amsterdam), 16(2):310-313, Oct. 1, 1972. 16 refs.*

A sputtered sodium beam was used to examine collisionally induced fluorescent excitation of nitrogen dioxide. The radiative lifetime was within 25-65 microseconds between 4050 and 7350 A. The intensity of the radiation rose monotonously from approximately 4000 A toward longer wavelengths. The threshold for excitation of radiative states of NO2 was determined at (3.3 + or 0.3) eV for wavelengths equal to or greater than 6950 A. (Author abstract modified)

25451 **APTIC NO. 46902**

Kranz, Erich

INVESTIGATIONS ON THE OPTIMUM CONDITIONS FOR THE GENERATION AND TRANSPORT OF AEROSOLS FOR SPECTROCHEMICAL PURPOSES. *(Untersuchungen ueber die optimale Erzeugung und Foerderung von Aerosolen fuer spektrochemische Zwecke). Text in German. Spectrochim. Acta, vol. 27B:327-343, 1972. 14 refs.*

Problems of the optimum conditions for the generation and transport of aerosols and suspensions for direct, electrode-independent introduction into the plasma for spectrochemical investigations are discussed. High aerosol concentration, uniform atomization, steady and possibly small maximum and mean droplet size, constant aerosol supply and small, steady aerosol losses are among the principal requirements for liquid aerosol generators and supply units. The quality of the aerosol transport is dependent on the settling rate of the aerosol particles, the flow rate of the carrier gas, and on both the length and diameter of the supply pipe. Transport-related losses occur due to recombination and conditions, while evaporation processes in many cases are desirable. Strong dependence of the spectral line intensity of the aerosol introduced into the plasma of the parameters of the aerosol generator, such as of the atomization pressure, the volume of the generator vessel, and the supply pipe length were revealed in experiments. Bubbles in the liquid pipe, droplets at the atomizing capillaries, and periodic or aperiodic cross-section reductions in the supply line are among the chief causes of troubles in the operation of the aerosol generator-supplier assembly. The hot chamber process of aerosol generation, taking advantage of the forced evaporation, is used increasingly, and studies of the ultrasonic generation method are in course. Optimum adjustment of the aerosol generator parameters to the plasma unit parameters for any individual excitation energy is necessary. Optimum spectral line intensity is obtained, e.g., when the atomizing gas throughput is equal to the gas discharge throughput with turbulent mixing of the plasma with the aerosol as a result. Separation and coagulation effects occurring when supplying dust to the plasma are avoided by the use of dust suspension in liquid, and of additional agitation or vibration. A newly developed apparatus for the generation and supply of aerosols and suspensions, providing high degree of reproducibility and constancy of linear emissions, is referred to.

25452 **APTIC NO. 46614**

Maksimov, Yu. Ya.

THERMAL DECOMPOSITION OF AROMATIC POLYNITRO COMPOUNDS VAPORS. *(Termicheskoye razlozheniye aromaticheskikh polinitrosoyedineniy v parakh). Text in Russian. Zh. Fiz. Khim., 46(7):1726-1731, July 1972. 13 refs.*

The kinetics of the thermal decomposition of the vapors of dinitrotoluene and trinitrobenzene isomers and their amino-, oxi-, methyl-, fluorine-, polychloro-, and bromine-substituted derivatives was studied by the barometric method in a temperature range of 270-350 C under a vacuum. The rates of gas formation from 2,4-, 2,6-, and 3,5-dinitrotoluenes, highest for 2,6 and lowest for 3,5 isomers, was about 10 times higher than from mononitrotoluene. The specific gas volume was 3-3.5 g-mol/g-mol. The temperature-dependence of the maximum rate of decomposition of the dinitro compounds of toluene and naphthalene was less pronounced than that of the initial rate of decomposition. The rate of decomposition of 1,5-dinitronaphthalene was much higher than that of nitrobenzene. The rates of decomposition of dinitrobenzenes decreased in the succession o-, n-, and m-isomers. The rate of decomposition of nitrotoluenes was maximum with methyl radical in o-position relative to the nitro radical. The rates of decomposition of trinitrobenzene and its substituted derivates decreased in the order 1,2,3-, 1,4,4-, 1,3,5-trinitrobenzene, while the rate of acceleration of the decomposition was higher than for dinitrobenzene. The specific gas volume was 4-4.5 g-mol/g-mol. Except for fluoronitrobenzene, the maximum rate of decomposition increased with the concentration. The acceleration of the rate of decomposition of the compounds investigated was due to the presence in the benzene ring of CH3, hydroxyl groups or bromine, or to the increased number of nitro radicals, while the accelerating effect of amino group, fluorine, or chlorine was less powerful. The decomposition of most of the compounds was self-accelerating with autocatalytic reaction during the accelerating phase.

25453 **APTIC NO. 46406**

McAdams, M. J. and L. I. Bone

REACTIONS OF NO+ WITH H2O IN A PHOTOIONIZATION MASS SPECTROMETER. *J. Chem. Phys., 57(5):2173-2177, Sept. 1, 1972. 16 refs.*

The reactions of the nitrosonium ion, NO(+), were studied in a photoionization mass spectrometer. Mixtures of nitric oxide and water were irradiated to produce a single primary ion, NO(+). The NO(+) ions produced by krypton resonance radiation at 10.03 eV reacted with water in a field free region. Products observed were NO(H2O)n(+) (n equals 1, 2, 3) and H(H2O)n(+) (n equals 1-5). The reaction mechanism was studied. Rate constants are calculated, heats of formation of hydrated NO(+) are estimated, and some evidence is presented which is consistent with a structure of NO(H2O)n(+) where the waters are hydrogen bonded in a linear fashion rather than forming a solvation sphere. (Author abstract modified)

25454 **APTIC NO. 47015**

Merryman, Earl L. and Arthur Levy

DISULFUR AND THE LOWER OXIDES OF SULFUR IN HYDROGEN SULFIDE FLAMES. *J. Phys. Chem., 76(14):1925-1931, July 6, 1972. 15 refs.*

The probing of hydrogen sulfide flames at pressures of 0.1 and 0.05 atm under molecular-flow sampling conditions has provided conclusive evidence on the type of transient species existing in these flames. The mass spectrometric analyses indicate the species to be sulfur, disulfur oxide (S2O), and sulfur monoxide (SO) and also provide evidence that the species appear in the sequence shown. The appearance of S2O prior to SO formation, as implied from the flame data, suggests that additional steps are involved in the oxidation of H2S which have not yet been considered in the oxidation process. The appearance of a species at m/e 34 which is more easily ionized in the mass spectrometer than H2S resulted in the speculation on the formation of hydrogen peroxide in these H2S flames. Estimates were made of the mass spectrometric sensitivities to the intermediate species; mole fractions of the species wery determined from these estimated values. Each species was present in concentrations up to several thousand ppm. Several elementary reactions are suggested to account for the formation of sulfur-containing intermediates in the H2S flame. (Author abstract modified)

25455 **APTIC NO. 47052**

Nix, Norbert

DROPLET CONDENSATION AND EVAPORATION IN THE SUBMICROSCOPIC RANGE. *(Tropfenkondensation und Verdampfung im submikroskopischen Bereich). Text in German. Staub, Reinhaltung Luft, 32(10):412-415, Oct. 1972. 8 refs.*

The growth and evaporation rate of a single water droplet in a micro-condensation chamber can be analyzed from photographs. Results were obtained with an improved apparatus. By using an ultra-sensitive photomultiplier instead of film it was possible to measure the growth rate for droplets down to the submicron range. Individual micro-droplets were illuminated from all sides in rotational symmetry. The scattering intensity of a particle of the size 2r was calculated and graphically illustrated in semi-logarythmic scale. In four graphs the particle growth curves for different pressure frequencies (8, 10 and 5 Hz), and pressures amplitudes + or 9.5, 12.7, and 13 torr) are shown. All curves show that the growth process takes place during oversaturation (first half period), and evaporation during undersaturation (second half period). The Particle size maximum occurs one quarter period after the pressure minimum. Knowledge of the growth and evaporation velocities of condensation droplets is important for aerosol measurements, for understanding the operation of wet dust collectors, and for cloud physics, to name only some fields of application.

25456 **APTIC NO. 46899**

Poppe, Michael

HEAT AND SUBSTANCE TRANSFER AT EVAPORATION COOLING FOR COUNTER AND CROSS FLOW. *(Waerme- und Stoffuebertragung bei der Verdunstungskuehlung im Gegen- und Kreuzstrom). Text in German. Technische Univ., Hannover (West Germany), Inst. fuer Thermodynamik. Thesis (Ph.D.), Hannover, West Germany, 1972, 151p. 57 refs.*

For avoidance of the emission of evaporated water or water droplets by counter-flow evaporation coolers, the state of the discharged air must be exactly known in order to initiate countermeasures. The basis of any reliable calculation of the evaporation cooling process is Merkel s theory. Merkel s simplifying assumptions, however, may lead to considerable errors particularly when the system approaches a state of equilibrium. Since it poses no difficulties nowadays to carry out the calculation without simplifying assumptions, even if the computation becomes much longer than Merkel s main equation, a differential equation system was derived from assumptions which are always valid. However, it can be applied for unsaturated air only. For expansion of the equation system to saturated air, evaporation experiments were carried out. For proving the reliability of the new equation system, the past experiments were evaluated. The measured results concerning the condition of the cooling air upon exit agreed well with the calculated results. Moreover, equations for the calculation of cross-flow cooling systems were derived. A system of partial first order differential equations was obtained which describes the changes of water and air in the installations. Because of its non-linearity, the system was solved iteratively by the method of central differences. Examples for both the accurate method and the simplified method by Merkel were calculated. Flow diagrams and the computer programs in ALGOL are provided.

25457 **APTIC NO. 46861**

Pratte, B. D. and J. F. Keffer

THE SWIRLING TURBULENT JET. *Preprint, American Society of Mechanical Engineers, New York, 9p., 1972. 8 refs. (Presented at the American Society of Mechanical Engineers, Gas Turbine and Fluids Engineering Conference and Products Show, San Francisco, Calif., March 26-30, 1972, Paper 72-FE-18.)*

An experimental investigation was made of a swirling jet having a moderate ratio of swirling to axial momentum. Measurements showed that the flow achieved a self-similarity for the mean velocities rather quickly while the normal turbulent intensities reached a self-similar state after a longer period of jet development. Conservation arguments were used to predict streamwise decay rates for the mean quantities. The entrainment rate and angle of spread for the swirling jet were nearly twice that of the non-swirling free jet. (Author abstract modified)

25458 **APTIC NO. 46913**

Rolker, J.

SULFURIC ACID CONDENSATION ON A DEW POINT MEASURING UNIT. *(Schwefelsaeurekondensation auf einem Taupunktmesskopf). Text in German. Brennstoff-Waerme-Kraft, 24(9):343-344, Sept. 1972.*

The condensation of sulfuric acid and water at below dew point temperature was studied in test gases of defined composition and in flue gases from oil-firing systems. On a dew point measuring head made of glass equipped with point electrodes, the condensation was observed with a microscope and photographed. The droplets which formed grew in size with the length of time, while the number of droplets per area unit dropped. If soot covered the measuring area, as is always the case with the waste gas of an oil-fired furnace, the droplets assumed spherical shape with a wetting angle of less than 90 deg. Upon contact between two growing drops they immediately united to form one larger drop. The increase of the conductivity can be explained by the presence of dirt which is wetted by adsorption of sulfuric acid and water.

25459 **APTIC NO. 46708**

Shishkov, D., D. Ivanov, and I. Dombalov

CARBON MONOXIDE CONVERSION WITH WATER VAPOR ON A LOW-TEMPERATURE BNTK II CATALYST. *(Konversiya okisi ugleroda vodyanym parom na nizkotemperaturnom katalizatore BNTK II). Text in Russian. Khim. Prom. (Moscow), no. 7:35-37, 1972. 8 refs.*

Pilot plant study on the conversion of carbon monoxide with water vapor on a BNTK II-type catalyst was conducted in Bulgaria. The catalyst contains 30% copper oxide, 30% zinc oxide, 38% chromium trioxide, and 2% binding agent. The catalyst, made in the form of 5 by 5 mm tablets, has a specific surface of 81 sq m/g, with maximum pore radius of 100-140 Angstrom. Two different experiments with pressures of 19 and 29 kp/sq cm and gas mixtures containing 3.6% and 5.1% CO, 15.3% and 0.8% carbon dioxide, 60% and 89% hydrogen, and 1-5 mg/cu m hydrogen sulfide, were performed. The water vapor-to-gas ratio was maintained between 0.6 and 0.7. The results show high catalytic activity and good thermal stability of the BNTK II catalyst within the investigated temperature range of 180-220 C. The loss of activity after 140 days operation under 19 kp/sq cm pressure was negligible, and an exposure to 450 C over 5 hr caused no impairment in the activity. The presence of H2S in the gas mixture caused gradual deterioration of the catalyst. Chlorine and ammonia were poisons for the catalyst investigated. The above process is also suitable for the hydrogenation of nitric oxide, oxygen, and unsaturated hydrocarbons.

25460 APTIC NO. 46795

Simonaitis, R. and Julian Heicklen

THE REACTION OF OH WITH NO2 AND THE DEACTIVATION OF O(1D) BY CO. *Intern. J. Chem. Kinet., 4(5):529-540, 1972. 23 refs.*

Nitrogen dioxide was photolyzed with 2288 A radiation at 300 and 423 K in the presence of water, carbon monoxide, and in some cases excess helium. The photolysis produced O(1D) atoms which reacted with H2O to give hydroxyl radicals or are deactivated by CO to O(3P) atoms. The reaction of HO with NO2 may play an important role in the stratospheric ozone balance due to conversion of nitrogen oxides, present naturally and introduced as pollutants by supersonic transport aircraft, to nitric acid which eventually appears as nitrate in rain water. The reaction is probably also important in polluted air. From the measured quantum yield of carbon dioxide formation as a function of reactant pressures, inert gas pressure, and temperature, the rate coefficient could be obtained as a function of total pressure and temperature. (Author abstract modified)

25461 APTIC NO. 46796

Simonaitis, R., Raymond I. Greenberg, and Julian Heicklen

THE PHOTOLYSIS OF N2O AT 2139 A AND 1849 A. *Intern. J. Chem. Kinet., 4(5):497-512, 1972. 19 refs.*

The method of chemical difference was utilized to accurately determine the relative importance of all the reaction steps in the direct photolysis of nitrous oxide at 2139 and 1849 A, as well as in the mercury-6 (1P1)-sensitized photolysis of N2O at 1849 A. Cyclopropane added in trace amounts showed a slight, but not significant, difference in product ratios (nitrogen and oxygen). The quantum yield of O(3P) was estimated from all possible sources as 0.02 plus or minus 0.02. Experiments with excess N2 at 1849 A indicated that O(1S) was not produced in the direct photolysis. The O(1D) atom can react with N2O to produce N2 plus 02 or 2NO. The rate coefficient was 0.69 plus or minus 0.05 in all cases. When combined with other data, the average value is 0.65 plus or minus 0.07; this represents the value for translationally energetic O(1D) atoms. When excess helium was added to remove the excess translational energy, the rate coefficient rose to 0.83 plus or minus 0.06, which is in reasonable agreement with the value of 0.01 plus or minus 0.06 found in another laboratory. For O(1D) atoms with no excess thermal energy, the rate coefficient was 0.90 plus or minus 0.10. (Author abstract modified)

25462 APTIC NO. 46664

Smith, Tennyson

CHLORINE ADSORPTION ON CLEAN ALUMINUM. *Surface Sci., 32(3):527-542, Sept. 1972. 15 refs.*

The preparation of clean aluminum films on aluminum and the adsorption of chlorine gas on these films were studied by Auger spectroscopy, ellipsometry, and surface potential measurements. The chlorine adsorption mechanism involved adsorption in a precursor state as molecular chlorine, followed by dissociation and chemical reaction. At room temperature, at least two monolayers formed within an hour at a chlorine pressure of 0.000002 torr. The heat of physisorption and the heat of reaction were estimated at 4 kcal/mol and equal to or less than 22 kcal/mol, respectively. At higher temperatures, desorption occurred from both states. (Author abstract modified)

25463 APTIC NO. 46987

Spencer, John D. and Bill Linville

BUREAU OF MINES ENERGY PROGRAM, 1971. *Bureau of Mines Information Circ., no. 8551, p. 85-102. 201 refs.*

A bibliography of 201 publications pertaining to environmental research and activities concerned with coal, petroleum, shale oils, and fuels combustion is presented. References pertain to coal mine safety, coal storage, preparation, and transportation. Electric power generation from coal is included, as well as coke, char, and chemicals from coal carbonization, fluid fuels and chemicals from coal by the synthesis process, new products from coal, and chemical and physical properties of coals and related materials. Petroleum exploration and production, composition, oil recovery from tar sands, thermodynamics, properties of petroleum products, characteristics of shale oils, and fuels combustion are also covered.

25464 APTIC NO. 46572

Stavitskaya, A. V.

ON THE CAPTURE OF WATER AEROSOL DROPLETS BY PLANE OBSTACLES IN THE FORM OF STAR-SHAPED CRYSTALS. *(O zakhvate kapel vodnogo aerozolya ploskimi prepyatstviyami v forme zvezdchatykh kristallov). Text in Russian. Izv. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana, 8(7):768-772, July 1972. 8 refs.*

The capture of water aerosol particles by plane obstacle of complicated shape in aerodynamic tube in the range between viscous and potential flow-around was determined for studies of the coagulation growth of cloud particles. Six-pointed stars with a radius of 3.4 mm and spoke widths of 0.5, 0.7, and 0.9 mm, made of freshly gelatinized film, were used as obstacles for the saturated aerosol at a flow rate of 0.9 m/sec and a water content of 3 g/cu m. Over-all and local capture coefficients were determined. The local capture coefficient was dependent on the coordinates, particularly the spoke width, of the star-shaped obstacle and on Stokes numbers. The capture coefficients were a function of the spoke width in a Stokes number range of 0.05-0.320, whereas they were constant beyond that range. Star-shaped obstacles were revealed to be more effective than disc-shaped ones. The minimum Stokes number for star-shaped obstacles at a Reynolds number of 220 was 0.05.

25465 APTIC NO. 46936

Story, Paul R., Everest A. Whited, and John A. Alford

MECHANISMS OF OZONOLYSIS. ISOLATION OF THE DIOXETANE INTERMEDIATE. *J. Am. Chem. Soc., vol. 94:2143-2144, 1972. 16 refs.*

The dioxetane intermediate was isolated from the ozonolysis of several different olefins, and it appears that this will be a general phenomenon for ozonolysis reactions. The technique employed, i.e., ozonolysis in Baeyer-Villiger solvents, represents a very useful synthetic procedure for the cleavage of double bonds.

25466 APTIC NO. 46578

Takahashi, Kanji and Toshio Tamachi

SOME EXPERIMENTS ON ADSORPTION OF SO2 GAS ON METALLIC FUME PARTICLES. *(Aryusan gasu no kinzoku fumu e no kyuchaku ni kansuru ni, san no jikken). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 7(1):1-6, 1972. 13 refs.*

The adsorption of sulfur dioxide on metallic fume particles (lead and iron) was studied using analyzing filters with 6.5% sampling efficiency for SO2 gas and nearly 100% efficiency for aerosol particles. The SO2 gas was labelled with radioactive (35)SO2, the test fumes were submicron lead or ferrous particles. The adsorption of SO2 on the particles increased with the increase in atmospheric humidity and reaction time. A major part of the SO2 adsorption was irreversible, particularly at high humidities.

25467 **APTIC NO. 46633**

Tsuji, Kozo and Takuo Takeshita

ESR OBSERVATION OF TRANSIENT ACYL RADICALS IN POLYETHYLENE IRRADIATED IN THE PRESENCE OF CO. *Polym. Lett., vol. 10:185-188, 1972. 16 refs.*

Carbon monoxide molecules combine with alkyl radicals in irradiated polyethylene at about -120 C to form acyl radicals as a transient species during the warm-up process from -196 C to room temperature. Irradiations with electron beams were carried out at -196 C with a dose rate of 140,000 rad/sec. Electron spin resonance spectra were recorded at -196 C for the first time and then at higher temperatures by using a variable temperature accessory. Microwave power was about 1.6 mW which was obtained by attenuation of 20 dB of the full power of a klystron. As suggested in previous papers, the primary process of photo-induced radical formation in polyethylene was confirmed to be a Norrish type I reaction of carbonyl groups contained in the polymer.

25468 **APTIC NO. 46392**

Yanagihara, Shigeru, Isamu Shimada, and Fumitake Chisaka

EXPERIMENTS ON PHOTOCHEMICAL REACTIONS USING A SMOG CHAMBER. *(Sumoggu chamba ni yoru kokagaku hanno no jikken). Text in Japanese. Japan Society of Air Pollution, Proc. Japan Soc. Air Pollut., Meet. Air Pollut. Caused Photochem. Reaction, 1972, p. 35-48.*

Experiments were conducted on the photochemical reaction of automotive exhaust gas. A gas sample was irradiated with ultraviolet rays in a smog chamber, and the resulting gas was analyzed. The formation of nitrogen dioxide from nitric oxide was rapid initially, and the reaction rate increased by increasing hydrocarbon concentration but decreased by increasing NO concentration. The reaction rate was relatively rapid at a humidity of 40% to 70% and was largely reduced at a humidity higher than 90%. Among the hydrocarbons, olefins were the most reactive and paraffins the least reactive. The concentration of formaldehyde increased as the hydrocarbons decreased.

25469 **APTIC NO. 46582**

Yanagihara, Shigeru, Isamu Shimada, Fumitake Chisaka, and Keizo Saito

IRRADIATION CHAMBER TESTS OF AUTOMOTIVE EMISSIONS. (I). *(Jidosha haiki gasu no kokagaku hanno jikken (Daiippo)). Text in Japanese. Kikai Gijutsu Kenkyusho Shoho (J. Mech. Eng. Lab.), 26(5):189-204. Sept. 1972. 8 refs.*

The photochemical reactions of auto exhaust were studied in a smog chamber using ultraviolet rays to simulate sunlight. The chamber design and experimental procedures are described. The rate of photochemical reaction was affected proportionally by the intensity of ultraviolet radiation. Reaction rate also increased in proportion to hydrocarbon concentrations and with an increase in temperature but decreased in proportion to the nitric oxide concentration. Other factors that influenced the reaction rate included the initial ratio of hydrocarbon-nitrogen oxides concentrations, relative humidity, and hydrocarbon reactivity. The formation of formaldehyde was closely connected to hydrocarbon reactivity. In the dark, oxidant concentration decreased while formaldehyde concentration remained stable for many hours.

25470 **APTIC NO. 46556**

Yoshimori, Takayoshi and Makoto Nonomura

THE USE OF HEATED SODIUM CHLORIDE TO RECOVER THE MIST OF SULFURIC ACID. *(Kanetsu shokuen o mochiiru sansanka io no hoshuho). Text in Japanese. Bunseki Kagaku (Japan Analyst) (Tokyo), 21(6):813-814, 1972. 2 refs.*

Heated sodium chloride was used to convert sulfuric acid mist to hydrogen chloride. A definite amount of H_2SO_4 was produced by heating potassium hydrogen sulfate at 800 C. The acid was then allowed to react with the salt at 450 C. Nitrogen was used as a carrier gas, and the rate was about 700 ml/min. Hydrogen chloride thus produced was introduced into the water contained in absorbing bottles and determined volumetrically. About 90% of the H_2SO_4 produced was converted into HCl, which was completely collected in the first absorbing bottle. This process may be useful for the determination of H_2SO_4 mist and for removing sulfuric materials in waste gases.

1971

25471 **APTIC NO. 46756**

Bertin, Francois and Germaine Thomas

COMMENTS ON THE CHEMISTRY OF CO-ORDINATION OF BERYLLIUM. II. ORGANIC COMPOUNDS OF BERYLLIUM AND THEIR COMPLEXES. *Bull. Soc. Chim. France, no. 11:3951-3958, Nov. 1971. 60 refs. Translated from French. 24p.*

Research pertaining to the organic compounds of beryllium is reviewed, including reaction mechanisms and the nature of the chemical bonds. Polymerization, coordination, and the stability of the compounds which form are considered.

25472 **APTIC NO. 46422**

Ebert, Fritz

THE FLOW OF GAS-SOLID SUSPENSIONS NEAR THE WALL. *(Zur wandnahen Stroemung von Gas-Feststoffsuspensionen). Text in German. Preprint, Erlangen-Nuernberg Univ. (West Germany), Inst. fuer Mechanische Verfahrenstechnik, 8p., 1971. 5 refs. (Presented at the Verfahrenstechnik Gesellschaft-Dechema-Fachausschusses Kniebis, West Germany, Nov. 22-23, 1971.)*

The interaction between solid particles and a gas in a turbulent boundary layer flow is discussed. The relaxation time was introduced which is a measure for the time a particle needs for deceleration of a differential velocity to that of the ambient medium. A particle that gets in contact with a turbulency which lasts much longer than the relaxation time of the particle will share the movement of the turbulency. If the opposite is the case, the particle movement is not affected. The energy dissipated during the slowdown of a particle in the turbulent flow is determined by the average movement of the carrier medium. An estimate of the increase in the dissipation of energy due to the presence of particles at low solids loading shows that the interaction between particles and dissipative turbulences is important. It also shows that this energy loss is higher in the transitional layer by one order of magnitude than it is at the edge of the boundary layer.

25473 **APTIC NO. 46459**

Gaughan, Renata A. Rysnik

INFRARED SPECTRA AND GEOMETRY OF MATRIX ISOLATED SO_2 AND SEVERAL ALKALI METAL OXIDES. *Pennsylvania Univ., Philadelphia, Dept. of Chemistry. Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1971, 314p. 260 refs.*

The application of matrix isolation vibrational spectroscopy as an alternative to microwave spectroscopy and electron diffraction for the determination of structures of isolated molecules was explored. Use was made of the dependence of the observed vibrational bands and changes of these bands on isotopic substitution on the molecular geometry. This dependence was quantitatively assessed through application of symmetry selection rules and precise frequency measurements on the fundamental modes of suitably chosen isotopes. The quadratic valence force calculations from which structural conclusions have been drawn have generally involved three basic assumptions: anharmonic corrections to the observed frequencies are small enough to be ignored; differences between observed gas phase and matrix frequencies may be neglected, the molecular geometry and structural parameters are the same in the gas and matrix phases within the limits of accuracy imposed by any vibrational calculation. These assumptions were tested by the determination of the geometry and force constants of sulfur dioxide isolated in Krypton matrices at 20 K and comparison with the results of gas phase microwave and infrared data. The vibrational analysis of six distinct isotopic species of SO2 showed that the apex angle and force constants of SO2 in the matrix are in agreement with the free molecule parameters. The measured frequencies for only two isotopes can be used to establish upper and lower limits of the bond angle whose average is in very good agreement with the established values of the parameters for the unperturbed molecule. The reactions of the alkali metals, sodium, potassium, cesium, and rubidium with molecular oxygen in argon matrices at 4 K and in krypton matrices at 20 K were examined in the infrared. The major molecular species identified were MO2 (C2v symmetry) and M2O2(D2h symmetry), where M is the alkali metal. In all these molecules a strong O-O bond is postulated. It is suggested that these molecules are highly ionic. The valence electron of the alkali metal(s) has been transferred to the oxygen molecule(s) resulting in an assembly of ions whose bonding is principally due to Coulombic interactions. The oxygen-oxygen vibrations can be considered to act independently at any metal-oxygen motion. (Author abstract modified)

25474 **APTIC NO. 46504**

MacFadden, Kenneth Orville

FAST TIME-RESOLUTION OF PHOTOCHEMICAL STUDIES IN A TIME-OF-FLIGHT MASS SPECTROMETER. *Georgetown Univ., Washington, D. C., Dept. of Chemistry, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., Nov 1971, 184p. 75 refs.*

A new design for coupling a flash photolysis reaction chamber to a time-of-flight mass spectrometer permitted low pressure photochemical studies of rather complex systems. Electromagnetic interference from the flash discharge, as observed in earlier work, was reduced to a level that poses no limitation on the technique. Negligible heating of the reactant from the flash lamp was observed. The design and several of its modifications are applicable to numerous systems, two of which, discussed in detail, are the photolysis of divinylether (CH2CHOCHCH2), and the photolysis of methyl iodide. In the photolysis of methyl iodide, methyl radicals were observed and the rate constant for their decay in dilute mixtures with argon was 7.4 + or 1.5 times 10 to the minus 11th power cc/mole/sec in good agreement with the literature value. The rate constant for the reaction I((2)P -sub 1/2) + CH3I yields CH3 + I2 was 3.3 + or - 0.7 times 10 to the minus 13th power cc/mole/sec at an estimated temperature of 750 K. The products of the photolysis were ethane, methane, and iodine. In the photolysis of divinylether vinyl, radicals were detected and the rate constant for their decay in dilute mixtures of neon was 4.1 + or 0.8 times 10 to the minus 12th power cc/mole/sec. The major reaction of the vinyl radicals was the disproportionation to form ethylene and acetylene. Although vinoxy radicals would also be expected, they were not directly observed in this study, presumably due to their rapid decomposition to carbon monoxide and methyl radicals. Ethylvinylether was also photolyzed and ethyl radicals were observed to decay with a rate constant of 3.3 + or 0.7 times 10 to the minus 12th power cc/mole/sec. A mass balance was performed and compared with earlier work. (Author abstract modified)

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25475 **APTIC NO. 46841**

Ayres, Stephen M.

THE AUTOMOBILE--WHAT A WAY TO GO. *Nat. Tuberc. Respirat. Dis. Assoc., Bull., 58(5):2-4, June 1972.*

Less obvious than the 50,000 American lives lost each year in automobile accidents, but potentially even more destructive, are the 64 million tons of carbon monoxide, the 8 million tons of nitrogen oxides, and the 17 million tons of hydrocarbons produced by the automobile, for example, in 1968. The impact of the automobile on the atmosphere, the toxicity of carbon monoxide, California smog, and the effect of nitrogen oxides are considered. The effect of carbon monoxide on hemoglobin is mentioned, as well as cardiac and respiratory effects.

25476 **APTIC NO. 46849**

Bauchinger, M. and E. Schmid

THE CYTOGENIC EFFECT OF LEAD IN HUMAN LYMPHOCYTES. *(Die cytogenische Wirkung von Blei in menschlichen Lymphozyten). Text in German. In: Blei und Umwelt. Kommission fuer Umweltgefahren des Bundesgesundheitsamtes (West Germany), Arbeitsgruppe Blei, p. 96-109, 1972.*

The cytogenic effect of lead on human lymphocytes was determined by in-vivo and in-vitro experiments. The in-vitro tests were performed on lymphocyte cultures of three healthy persons. Sterile lead acetate solutions in various concentrations were added to the blood culture for 24 hours. All numerical and structural chromosome aberrations as well as achromatic gaps were determined. For the in vivo experiments, chromosome analyses of persons occupationally exposed to lead were performed. The cultivation time of the plasma of the test persons was 48 hours. The results of the in-vitro examinations showed that a 0.01 mol lead acetate solution was toxic for the lymphocytes. The cells in 48-hour as well as 72-hour cultures died. The highest tolerable lead acetate concentration thus was 0.001 mol. The number of chromatid ruptures was slightly higher in the lead acetate cultures compared to the normal control cultures, but not higher than those in the sodium acetate controls. The in-vivo examinations yielded no significant differences between the control group and the test group concerning the number of aberrations. In one person, however, a cell with a dicentric chromosome was observed. Whether this was related to lead will have to be studied in further experiments.

25477 **APTIC NO. 46412**

Berge, Helmut

PROBLEMS OF EMISSION CLASSIFICATION IN THE BIOSPHERE. *(Problematik der Immissionsklassifikation in der Biosphaere). Text in German. Naturw. Rundschau., 25(9):346-348, Sept. 1972. 3 refs. (Presented at the Johannes-Gutenberg-Universitaet, Humanoekologischen Seminar, Mainz, West Germany, Oct. 2, 1972.)*

A classification of emissions into negligible, moderate, considerable, and intolerable is recommended. The emissions are negligible when the development, function, growth, immunity and/or lifetime, as well as the well being of autotrophic and/or heterotrophic living organisms is not influenced in its optimum physiological and psychic development. They are moderate if a reversible influence is discernible, considerable if the influence produces repeated and irreversible disturbances, and intolerable if any of the above processes is prevented or terminated with extensive anomalies of certain organs or entire organisms. The modern industrial society will be able to sustain its achievements only if the simultaneously produced changes of the environment are reversed to maintain a healthy ecosystem. The institutions necessary for this already exist but the careful realization of much of what is known is lacking.

25478 **APTIC NO. 47005**

Bergman, I. and C. Casswell

LUNG DUST AND LUNG IRON CONTENTS OF COAL WORKERS IN DIFFERENT COALFIELDS IN GREAT BRITAIN. *Brit. J. Ind. Med. (London), 29(2):160-168, 1972. 18 refs.*

When lung dust from seven coalfields was studied, the average dust composition was found to vary significantly with the rank of coal. The higher the rank, the higher the coal percentage and the lower the quartz percentage of the lung dust. This held for all coalfields except in Scotland, where lung dust contained mainly soot instead of coal. Samples of airborne dust collected at the coalface in different coalfields showed a similar but small variability of composition with rank of coal, and the results from Scotland were in good agreement with the results from other coalfields. The amount of iron in simple pneumoconiosis lungs was related to the mineral and coal content and the years the men spent underground. The strongest relationship was with coal and mineral for coalface workers from England. For pit accident cases (all simple pneumoconiosis), mineral was important as well as years underground, while for simple pneumoconiosis cases from Scotland, years underground was the most important factor. (Author abstract modified)

25479 **APTIC NO. 46970**

Brooks, Stuart M., Sheldon Montz, and Earle Weiss

CHANGES OCCURRING AFTER FREON INHALATION. *Am. Rev. Respirat. Disease, 105(4):640-643, April 1972. 12 refs.*

Inhalation of an inert aerosol propellant by 13 patients with bronchial asthma generally resulted in no sustained significant changes in arterial oxygen tension. The effects noted on the heart rate, blood pressure, and electrocardiogram appeared inconsequential. Increases in airway resistance were noted in five patients after inhalation of Freon, but the net effect is that bronchodilation occurred when the inert propellant contained isoproterenol. The magnitude of blood gas changes after inhalation of Freon or Freon-isoproterenol was similar, although different physiologic mechanisms appeared to be operating. (Author summary modified)

25480 **APTIC NO. 46911**

Cederlof, R., L. Friberg, R. J. M. Horton, and Z. Hrubec

RELATIONSHIP OF RESPIRATORY SYMPTOMS IN TWINS TO RESIDENCE ASSOCIATED AIR POLLUTION, SMOKING, AND OTHER FACTORS. *Preprint, American Medical Assoc., Chicago, Ill., 17p., 1972. 13 refs. (Presented at the Air Pollution Medical Research Conference, 13th, Chicago, Ill., Oct. 2-3, 1972.)*

A twin study is reported which examines the effect of residence-associated, long-term air pollution exposure in pairs of highly similar individuals, who share many social characteristics, who are of the same age and sex, and some of whom are genetically identical. The data were obtained through questionnaires mailed to members of the Twin Registry operated by the National Research Council. Information was obtained on respiratory symptoms, smoking habits, drinking habits, socioeconomic status, and residential history. While smoking and consumption of alcohol are important factors in chronic respiratory disease, air pollution associated with urban residence does not appear to be related to this syndrome after the effects of smoking and other factors are controlled.

25481 **APTIC NO. 46818**

Ishizaki, Tatsushi, Junzaburo Kabe, Masaaki Tomaru, and Keiichiro Nakagawa

CLINICAL STUDY OF THE EFFECT OF AIR POLLUTION UPON ASTHMATIC PATIENTS. *(Zensoku hossa ni oyobosu taiki osen no eikyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 7(1):7-12, 1972. 9 refs.*

Fifteen asthmatic patients of the atopic type in Tokyo were followed from Nov. 18, 1969 to Feb. 6, 1970, and hourly changes in atmospheric sulfur dioxide and suspended particles were recorded automatically. The days of ingravescent symptoms, especially with asthmatic attacks, were recorded and analyzed to determine the effect of air pollution. The asthmatic patients tended to develop critical symptoms on the day when SO2 was over 0.2 ppm and when suspended particulates, measured by the transparency decrease of filter paper, were over 50%. Severe air pollution continued to influence asthmatic attacks on the next day. Lung function tests using a respirometer and plethysmograph were taken on six patients, but no significant correlation was found between the tests and air pollution factors.

25482 **APTIC NO. 46810**

Jacobs, Cecil F. and Bettye Anne Langdoc

CARDIOVASCULAR DEATHS AND AIR POLLUTION IN CHARLESTON S. C. *Health Serv. Rep., 87(7):623-632, Aug./Sept. 1972. 1 ref.*

The relationship between cardiovascular deaths and air pollution was studied in Charleston, South Carolina. Atmospheric temperature inversions and thermal barriers created by the warming of the air overlying water resulted in the trapping of air pollutants in the area of the Charleston peninsula, thus causing excessive levels of air pollution. Cardiovascular death rates, compared to those in an adjacent population with lower levels of exposure, were significantly higher among the exposed population. Death rates decreased as air pollution controls were invoked and the ambient air quality improved. Both white and nonwhite groups were affected, and economic status did not provide any appreciably significant difference. (Author abstract modified)

25483 **APTIC NO. 46718**

Jech, J.

CARBON MONOXIDE AND ITS IMPORTANCE IN THE URBAN ATMOSPHERE. *(Kyslicnik uhelnaty a jeho vyznam v ovzdusi sidlisti). Text in Czech. Cesk. Hyg. (Prague), 17(2-3):93-99, 1972. 37 refs.*

Automobile traffic is responsible for 58% of all the carbon monoxide in the atmosphere, and airplane traffic for 2%. The correlation coefficient between automobile traffic density and atmospheric CO levels fluctuates between 0.75 and 0.95. In 1964 in Los Angeles the mean 8-hour diurnal CO concentration was 35 mg/cu m. Plants have low sensitivity to atmospheric CO; in the case of macroorganisms, the toxicity of CO is based on its reaction with hemoproteins. The effect of CO on the human organism is governed by concentration, length of exposure, and volume of ventilated air. After a certain exposure time an equilibrium is established. Exposure of experimental animals to a CO concentration of 115 mg/cu m for 6 weeks resulted in morphological changes in the brain tissues and the heart muscle. Short-term experiments with humans disclosed that the CNS reacted to 2% carboxyhemoglobin (COHb) or to an exposure of from 58 to 290 mg CO/cu m for 2 hours. Psychomotor test results were affected by concentrations around 5% COHb. The COHb levels between 0-1% caused no physiological changes, 2-5% COHb levels affected the judgment of time intervals, visual acuity, the relative threshold of visual readiness, and psychomotor activity. Individuals exposed to CO occupationally suffer from chronic CO intoxication manifested by headaches, vertigo, diarrhea, frequent urination, perspiration, loss of weight, reduced libido, and insomnia. A study of 331 policemen in Paris exposed daily for 5 hours to 12-14 mg/cu m CO disclosed that while COHb levels have not risen markedly in smokers, they have risen substantially in non-smokers. Most affected by CO are cardiacs, anemics, persons with metabolic defects and pulmonary diseases, and fetuses.

25484 **APTIC NO. 46883**

Kazuo, Ishii, Nobumatsu Ishikawa, Kenichi Nakamura, and Hiroshi Yanagawa

OBSERVATION OF FINDINGS OF NONSPECIFIC CHEST X-RAYS BY YEARS AND BY THE DEGREE OF AIR POLLUTION. *(Hi-tokoisei kyebu X-sen shoken shutsugenritsu no nenjibetsu, chiku taiki osendo betsu kansatsu). Text in Japanese. Nihon Kyobu Shikkan Gakkai Zasshi (Japan J. Thoracic Dis.), 10(10):574-575, Oct. 1972. (Presented at the Japan Thoracic Diseases Society, Annual Meeting, 12th.)*

Frequencies of nonspecific respiratory symptoms such as shadows in chest X-rays and atrophy of peripheral blood vessels differed in male inhabitants of polluted and non-polluted districts in 1970. Chest X-rays were taken in 1963 and 1968 of 2523 inhabitants of 40 polluted and 40 non-polluted districts in Japan. The frequency of respiratory disease symptoms in persons 55-64 years old was twice or three times that of 35-44 year olds in both 1963 and 1968. In 55-64 year olds, the frequency was 29.7% in polluted areas and 18.8% in non-polluted areas in 1963 and was 20% and 17.7%, respectively, in 1968. In 35-44 year olds, the frequency was 9.3% in polluted areas and 8.0% in non-polluted areas in 1963 and 8.7% and 6.7%, respectively in 1968. The coincidence by repeated readings of the graphs was 78%. The frequency of diseases was affected by air pollution, but the frequency has not increased very much recently.

25485 **APTIC NO. 46827**

Luers, H.

THE DIFFICULTY OF DETERMINING THE MUTAGENIC EFFECT. *(Zur Problematik der Mutagenitaetspruefung). Text in German. In: Blei und Umwelt. Kommission fuer Umweltgefahren des Bundesgesundheitsamtes (West Germany), Arbeitsgruppe Blei, p. 84-85, 1972.*

Somatic damage by a chemical substance can be directly determined on the affected human, for genetic changes, however, experimental studies are necessary since they become apparent at the earliest in the next or in future generations. Such experimental studies are carried out with microorganisms, multi-cell organisms such as Drosophila, mice, and cell cultures of humans and animals. With the latter method, only the chromosome changes can be determined, not the gene or point mutations which produce no microscopically visible anomalies. Studies of the mutagenic effect of lead have been carried out.

25486 **APTIC NO. 47003**

McClain, R. M. and B. A. Becker

EFFECTS OF ORGANOLEAD COMPOUNDS ON RAT EMBRYONIC AND FETAL DEVELOPMENT. *Toxicol. Appl. Pharmacol., vol. 21:265-274, 17 refs.*

Tetraethyl lead, tetramethyl lead, and trimethyl lead chloride were found to be essentially nonteratogenic in Sprague-Dawley rats. Oral doses of TEL (7.5, 15, or 30 mg/kg), TML (40, 80, 112, or 160 mg/kg), and TriML (15, 30, or 38 mg/kg) were administered as three divided doses during early organogenesis or late organogenesis. In addition, TriML was administered intravenously at doses of 20, 28, 33, or 40 mg/kg on individual gestation days 8 through 15 inclusive. The highest dose of each compound in each experiment was lethal to the maternal animal; lower dose levels produced typical slight to severe maternal organolead toxicity, dependent upon dose. Embryo or fetal toxicity was observed to accompany the administration of the organolead compounds and was characterized by growth retardation and delayed ossification of bone. Marked fetal effects were observed only in maternal animals that exhibited severe organolead toxicity and were, therefore, severely debilitated. Infusion studies with TriML revealed that the rate of placental transfer was minimal when blood concentrations were below an apparent saturation of binding sites on maternal erythrocytes and was greatly increased at maternal blood concentrations above this saturation point. When the maternal animal was by-passed by direct intra-amniotic injections of TriML, dose-related fetal lethality was observed. (Author abstract modified)

25487 **APTIC NO. 46573**

Molina, Cl., J. Delage, J. M. Aiache, J. Brun, Y. Fonck, and J. C. Cheminat

THE STATE OF THE BRONCHI IN PULMONARY DISEASES ASSOCIATED WITH THE INHALATION OF ORGANIC DUSTS. *(L'etat des bronches dans les maladies pulmonaires liees a l'inhalation de poussieres organiques). Text in French. Bronches, 21(5):444-470, 1972.*

Cases of asthma and alveolitis in farmers and poultry farm workers due to the inhalation of organic dust (hay and avian dejections) are discussed. Bronchial spasm, edema of the bronchial wall, and hypersecretion of the mucosa were the manifestations of asthma caused by the inhalation of house dust and animal hairs. Hay fever, dyspnea, cough, expectoration, and miliary lung are the symptoms of acute alveolitis caused by dust from moldy hay, especially in cold and humid climate (farmer's lung), or from avian dejections in poultry farm workers. Edema, vasculary congestion, hypersecretion of the mucosa, nodules of 200-300 micron in diameter in the bronchi, and interstitial granuloma in the parenchyma are observed. Chronic cases are characterized by diffuse interstitial pulmonary fibrosis, dyspnea, cyanosis, hippocratic fingers, polyglobulia, and the abundance of abnormal, collagenic fibers in the bronchi. Immunological investigations and precipitin tests revealed thermophilic actinomycetes to be responsible for these allergic diseases as they were identified in hay, avian dejections, and bagasse samples alike. The localization of immunopathological lesions is determined by the nature of the dust, its particle size and the quantity inhaled, and especially by the immunological condition of the subject.

25488 **APTIC NO. 46968**

Munn, A.

EXTRAPOLATION OF EXPERIMENTAL CARCINOGENICITY TO THE REALITY OF INDUSTRIAL EXPOSURE. *Ann. Occupational Hyg., vol. 15:75-79, 81, 1972. 13 refs.*

As more and more industrial chemicals are subjected to long-term investigation in laboratory animals, more and more are found to have carcinogenic properties. It is seldom realized how few of these industrial chemicals which are shown to have carcinogenic properties in animals can ever be shown to have caused tumors in man. In fact, in only one instance has any synthetic organic compound known to cause occupational tumors in man ever been previously identified as carcinogenic by animal experiment; this is 4-aminodiphenyl. More critical evaluation is needed of data derived from animal experiments which involve the deliberate introduction of large doses of chemical by a variety of artificial routes, and which do not replicate human industrial exposures in any way.

25489 **APTIC NO. 46828**

Obe, G. and K. Sperling

THE EFFECT OF LEAD ACETATE ON HUMAN LEUKOCYTE CHROMOSOMES IN VITRO. *(Zur Wirkung von Bleiacetat auf menschliche Leukozytenchromosomen in vitro). Text in German. In: Blei und Umwelt. Kommission fuer Umweltgefahren des Bundesgesundheitsamtes*

(West Germany), Arbeitsgruppe Blei, p. 90-95, 1972. 18 refs.

Micro-cultures were produced with the blood of a clinically healthy man and were incubated for 4 days at 37 C. Lead acetate (0.05 ml of an aqueous solution) was added 24, 8, and 4 half hours prior to the end of incubation. The concentrations in the 24 hour series were 0.001 to 0.00001 mol. Each time 100 C-metaphases were examined. For all aberrations found, no relationship to the doses could be determined, which is a clear indication that lead has no chromosome damaging effect. In the metaphases achromatic lesions, chromatid ruptures, isochromatid ruptures, and occasionally chromatid translocations were found. The latter occurred twice, once in a control culture and in a culture to which 0.00001 mol lead acetate was added 24 hours prior to the end of incubation. In each case it was a chromatid translocation from two homologous chromosomes. This is hardly an indication for the mutagenic effect of lead, but rather the result of somatic crossing over.

25490 **APTIC NO. 46577**

Orlowski, Andre

THE NOXIOUSNESS OF AIR POLLUTANTS II - THE CARBON MONOXIDE. *(La nocivite des polluants atmospheriques. II - L oxyde de carbone). Text in French. Tech. Moderne, 64(5):53-55, May 1972. 3 refs.*

General problems of the formation, toxicity, and the control of carbon monoxide emissions are reviewed. Carbon monoxide, accounting for largely 1/3 of the combined toxicity of all air pollutants, is generated in heating equipment, especially at combustion temperatures below 350 C and in internal combustion engines due to incomplete combustion. The CO has an affinity to hemoglobin 300 times as high as oxygen. The toxicity of CO in acute poisoning is largely proportional to the CO concentration in the air and to the exposure time. While the CO-hemoglobin bond is principally reversible, death occurs when the rate of CO saturation of the hemoglobin reaches some 66%. Asthenia, fatigability, reduced mental performance, somnolence, vertigo, accelerated pulse, tremor, and dyspeptic troubles are the symptoms of chronic CO poisoning. Automotive exhausts contain 1-6% of CO. Fat mixture, start-up, and acceleration favor the formation of high CO levels, and internal combustion engines emit more CO than diesel engines. Measurements performed in Paris revealed CO peaks in winter between 8 and 9 am and 6-7 pm. Carbon monoxide concentrations up to 400-1100 ppm were measured in closed places such as garages and tunnels. The 1969 emission standards require a maximum allowable exhaust CO content of 4.5%, and a further reduction to 2.5%, to be required at a later date, seems realistic. However, the proportion of vehicles whose CO emission exceeded 4.5% was 56% in 1970 and 42% in 1971. Exhaust CO emission can be controlled by measures such as exhaust purification, catalytic or thermal afterburning, the use of fuel additives such as polypropylene, the admixture of water to fuel in proportions up to 40%, or the switch-over to other types of engines, e.g., Wankel, turbine, steam, or electric. The addition of water to other fuels in also useful.

25491 **APTIC NO. 46852**

Pott, F. and A. Brockhaus

COMPARISON OF THE ENTERAL AND PULMONAL RESORPTION OF LEAD COMPOUNDS. *(Vergleich der enteralen und pulmonalen Resorptionsquote von Bleiverbindungen). Text in German. In: Blei und Umwelt. Kommission fuer Umweltgefahren des Bundesgesundheitsamtes (West Germany), Arbeitsgruppe Blei, p. 78, 1972.*

The enteral and pulmonal resorption of two lead compounds emitted with exhaust gases (lead bromide and lead oxide) was studied on rats. The animals received the lead compounds orally or intratracheally in various doses. After intratracheal injection, as much lead was found in the bones as after intraveneous injection. After oral application a much smaller concentration was found. A comparison of the various test groups which were subjected to differing conditions, revealed that the enteral resorption quota was only 2 to 6.8% of the pulmonally resorbed quantity, on the average about 5%. The pulmonally resorbed lead quantity per day must only be 5% of the lead content ingested with the food to have the same biological effect. The daily lead ingestion with the food is 300 micrograms. The air in many dense traffic areas contains on the average 2 micrograms lead/cu m air. A person inhales about 15 cu m air/day, and with it 30 micrograms of lead. With each inhalation, half of the lead contained in the air is retained in the lung and 100% resorbed. The lead intake through inhalation thus can, for persons in dense traffic areas, reach a higher value than the lead ingested with food.

25492 **APTIC NO. 46830**

Pott, R.

RECOMMENDATIONS BY OCCUPATIONAL MEDICINE. *(Arbeitsmedizinische Empfehlungen). Text in German. In: Blei und Umwelt. Kommission fuer Umweltgefahren des Bundesgesundheitsamtes (West Germany), Arbeitsgruppe Blei, p. 66, 70-77, 1972.*

A lead worker may inhale 1 to 1.5 mg lead during the 8 hour working period for the entire time of his working life according to the threshold limit value. It would take a policeman regulating traffic at a busy traffic intersection 100 hours (during unfavorable weather conditions) to inhale this quantity, and urban residents 200 to 400 hours. These two examples of non-occupational lead exposure show that it is far below the maximum allowable working area concentration. From the viewpoint of practical occupational medicine, all the heated discussion about lead as an air pollutant seems to be grossly exaggerated, which is not to say that the lead emission should not be reduced together with the overall air pollution. Research projects have given inconclusive evidence as to the effects of lead from automobiles on man, since men eat foods polluted with lead from automobile exhausts. Garbage collectors in Frankfurt had lead levels higher than that recommended.

25493 **APTIC NO. 46856**

Rhim, J. S., H. Y. Cho, L. Rabstein, R. J. Gordon, R. J. Bryan, M. B. Gardner, and R. J. Huebner

TRANSFORMATION OF MOUSE CELLS INFECTED WITH AKR LEUKAEMIA VIRUS INDUCED BY SMOG EXTRACTS. *Nature (London), 239(5367):103-107, Sept. 8, 1972. 16 refs.*

Transforming activity in the AKR leukemia virus infected mouse cell system by three city smog extracts is described. Production of sarcomas in newborn mice by most of the transformed cell lines derived from the transformed cultures is described. The transformed foci consisted of randomly oriented, spindle-shaped cells showing a loss of contact inhibition.

25494 **APTIC NO. 46886**

Ribon, Aric, Marvin Glasser, and Niphon Sudhivoraseth

BRONCHIAL ASTHMA IN CHILDREN AND ITS OCCURRENCE IN RELATION TO WEATHER AND AIR POLLUTION. *Ann. Allergy, 30(5):276-281, May 1972. 21 refs.*

An investigation was undertaken to determine the effects of weather and air pollution on the incidence of bronchial asthma attacks, and, in particular, the causes of the increase of bronchial asthma attacks during late September through early December. Daily records were kept on the following: carbon monoxide, sulfur dioxide, oxidants, and smoke shade; temperature, relative humidity, barometric pressure, and wind velocity; upper respiratory infections, the number of children with bronchial asthma seen in the pediatric emergency room, and the number of children admitted for bronchial asthma. The daily number of asthmatic visits were plotted against each of the variables studied for 1969 and 1970. Although pollutants were not related to asthma, a change in temperature appeared to be related to a change in the number of asthma patients visits to emergency rooms or admissions to hospitals.

25495 **APTIC NO. 46850**

Sattler E. L.

LEAD INTAKE AND DISTRIBUTION. RESULTS OF INHALATION EXPERIMENTS ON SMALL RODENTS AND WITH HUMANS AND INGESTION STUDIES WITH RATS. *(Blei-Aufnahme und Verteilung Ergebnisse von Inhalationsexperimenten an Kleinnagern und am Menschen und Ingestionsstudien an Ratten) Text in German. In: Blei und Umwelt. Kommission fuer Umweltgefahren des Bundesgesundheitsamtes (West Germany), Arbeitsgruppe Blei, p. 79-83, 1972.*

Inhalation experiments with rats with sodium chloride and silicon dioxide aerosols (average particle diameter 1.56 and 0.28 micron) have shown that the lead adhering to the aerosols is rapidly resorbed. For the experiments with gold hamsters, cigarette smoke aerosols were used because the lead in these aerosols is very similar to the lead in the exhaust gas of automobile engines. The resorption from the lung occurred in all examined cases with a half-time of 30 to 33 minutes. Through resorption the lead in the lung first gets into the blood serum where it settles more or less permanently in the erythrocytes, liver, and kidney. The studies with humans yielded a lung resorption half-time of 6.5. The lead discharge with the urine in the first 24 hours is below 3% of the total lead concentration in the body. The distribution of lead in the body of humans and animals differed greatly from each other. After inhalation, 50% of the lead in humans was found in the erythrocytes, while in animals this percentage is 25 to 30 at the most. In animals a high percentage is found in the kidneys, which is not so in humans.

25496 **APTIC NO. 46562**

Schlipkoeter, H.-W. and E. G. Beck

THE CELL DAMAGING EFFECT OF LEAD. *(Die zellschaedigende Wirkung von Blei) Text in German. Umwelt (Duesseldorf), 2(5):50-52, 1972. 15 refs.*

The increasing traffic density has lead to pollution of urban air with lead. The lead emitted by the exhaust gases is mostly inorganically bound and is present in the atmosphere as lead oxide, lead bromide, and lead chloride; it is component of the respirable atmospheric aerosols. With cells grown outside the body, particulate lead has a damaging effect on structure and metabolism. Alveolar macrophages of rats (in vitro) incubated with inorganic lead particles showed damage after the application of 3 micrograms/million cells. Two characteristic symptoms were observed. Five minutes after incubation with lead particles, the alveolar macrophages showed clear signs of necrosis and vacuolation. By damaging the alveolar macrophages, the lung cleaning process was inhibited, and a greater dust quantity could be retained in the lung, and the residence time of the inhaled aerosols prolonged. Lead weakens the resistance mechanism to infectious diseases. Several examples from the literature confirm this. For instance, lead increased the infection rate of mice with salmonelly typhi murium.

25497 **APTIC NO. 46981**

Schmidt, D., B. Sansoni, W. Kracke, F. Dietl, M. Bauchinger, and W. Stich

THE LEAD EXPOSURE OF MUNICH TRAFFIC POLICEMEN. *(Die Bleibelastung der Muenchner Verkehrspolizei). Text in German. Muench. Med. Wochschr. (Munich), 114(41):1761-1763, 1972. 17 refs.*

Lead levels in 29 traffic policemen in Munich showed increases with slight impairment of biochemical activity, recognizable by a medium increase in the blood lead (34%), in the erythrocytic protoporphyrin (25%), and in the urinary delta-aminolevulinic acid (22%) compared with the average population. The age of the policemen ranged from 27 to 57 years, the duration of their assignment to traffic regulations from 1-26 years. The lead determination was carried out by a method developed for this purpose. The blood samples were taken in the morning; 0.2 to 0.4 g were ashed with hydrogen peroxide. The lead was enriched by phosphate precipitation, and its nitric acid solution was determined by flameless atom absorption. The yield of the chemical analysis steps was controlled with radioactive lead (212) and was on the average 95%.

25498 **APTIC NO. 46854**

Schoeberl, A.

STUDY OF THE LEAD CONTAMINATION OF ANIMALS AND OF FODDER AND FOOD BY THE CHEMICAL INSTITUTE OF THE TECHNICAL UNIVERSITY HANNOVER IN THE YEARS 1960 TO 1970. *(Ueber die Untersuchung von Bleivergiftungen bei Tieren und in Futter- und Lebensmitteln im chemischen Institut der Hochschule Hannover in den Jahren 1960-1970) Text in German. In: Blei und Umwelt. Kommission fuer Umweltgefahren des Bundesgesundheitsamtes (West Germany), Arbeitsgruppe Blei, p. 50-51, 1972. 12 refs.*

From 1960 to 1970 a total of 562 samples of lead-contaminated animals were examined. Of these, 146 examinations brought negative results, i.e., the lead contamination was not high enough to justify any lead poisoning. Moreover, samples of fodder, food, and meat were analyzed. The lead was usually determined by polarography after the samples had been ashed at 500 C and the lead extracted with dithizone. The sources of lead contamination for the animals included lead-containing dust deposited on fodder and waste gases of a lead plant which contaminated the plants in the vicinity. A few animals were poisoned by licking on leaded paint, and feeding on leaded sand or ash. Of the symptoms, central nervous disturbances were most prevalent. Animals with a lead concentration of or more than 4 ppm in the liver were considered to have died of lead poisoning. Lead which is doubtlessly deposited in the liver, can be bound to ferritin. This helps to explain the mechanism of lead accumulation in the organism.

25499 **APTIC NO. 46851**

Schwanitz G., F. Gebhart, and H.-D. Rott

EXAMINATION OF THE CHROMOSOMES OF LEAD WORKERS. *(Chromosomen untersuchungen bei Bleiarbeitern) Text in German. In: Blei und Umwelt. Kommission fuer Umweltgefahren des Bundesgesundheitsamtes (West Germany), Arbeitsgruppe Blei, p. 86, 1972.*

The chromosomes in lymphocytes of eight workers of a lead oxide plant were analyzed. Increased secondary chromosome anomalies were found among the workers compared to a control group. The most frequent aberration found was chromosome gaps. A positive correlation between the number of disturbed mitoses and the aminolevulinic acid discharge was found. No relationship to the lead level in the blood could be determined. Examinations with another group of lead worker numbering more than 100 whose lead level was lower than that of the previous group also showed secondary chromosome aberrations. While 1/3 had normal values, another 1/3 had slightly higher aberrations, and the rest had, significantly higher ones. No positive correlation to the measured ALA was determined this time. During the in-vitro experiments with lead acetate a higher number of chromosome aberrations occurred, but no clear dependence on the concentration could be determined.

25500 **APTIC NO. 46706**

Sidorenko, G. I., F. F. Lampert, I. A. Pinigina, V. A. Klebanova, V. P. Osintseva, and A. F. Nazarenko

EXPERIMENTAL SUBSTANTIATION OF MEASURES OF AIR SANITATION IN GAS SUPPLIED APART-

MENTS. *(Eksperimentalnoye obosnovaniye meropriyatiy po ozdorovleniyu vozdushnoy sredy gazifitsirovannykh kvartir.) Text in Russian. Gigiena i Sanit., no. 7:24-28, 1972. 12 refs.*

Problems of domestic gas-burning equipment-generated air pollution, and an animal test concerning the toxic effect of such air pollution are described. Carbon monoxide, formaldehyde (0.043 mg/cu m), nitrogen dioxide (0.44 mg/cu m), nitric oxide (0.60 mg/cu m), and benzene (0.07 mg /cu m) were detected in the air of apartments during the use of gas ranges or gas stoves. The formaldehyde and nitrogen dioxide concentrations exceeded the maximum allowable values. Two groups of young male white rats were exposed to a similar atmosphere over 3 and 6 hours daily over 125 days to determine the effects of gas heating equipment air pollutants. Reduced gain in weight, tendency of leukocytosis, significant increase in carboxyhemoglobin, and significantly reduced motor chronaxy were observed. A slight degree of dystrophy of the parenchymatous organs, dilation of the liver sinusoids, kidney, and lung capillaries, disturbed hydrocarbon metabolism in the liver, increased hemosiderin level in the spleen, and inhibited division of the epithelial cells in the cornea and the bone marrow in the first group were observed. The above symptoms intensified in the group exposed over 6 hours daily, and parenchymal atelectasis and emphysema, and increased inhibition of the karyokinesis were also detected. The results stress the need for air sanitation in gas-supplied apartments. Kitchen gas ranges equipped with flameless gauze type burners and exhaust of the combustion products are recommended. No CO, nitrogen oxides, benzene, and formaldehyde in apartments equipped with such ranges were detected.

25501 **APTIC NO. 46828**

Sperling, K., G. Weiss, M. Muenzer, and G. Obe

CHROMOSOME STUDIES AT LEAD EXPOSED WORKERS. *(Chromosomenuntersuchung an bleiexponierten Arbeitern.) Text in German. In: Blei und Umwelt. Kommission fuer Umweltgefahren des Bundesgesundheitsamtes (West Germany), Arbeitsgruppe Blei, p. 87-89, 1972. 5 refs.*

Five workers from a lead-battery producing plant who were exposed to lead from 6 weeks to 15 years were used for chromosome studies. From each person of the test group and the control group, 100 metaphases were evaluated. For the chromosome analysis the slightly modified micromethod by Arakaki and Sparkes was used. The leukocyte cell cultures were analyzed after 48 hours so that all examined cells were in the first mitosis. The rate of the chromosome aberrations was in no way different from the control values.

25502 **APTIC NO. 46673**

Straus, P.

THE HEALTH OF CHILDREN IN URBAN ENVIRONMENT. SOME MEDICAL AND SOCIAL PROBLEMS. *(La sante de l enfant en milieu urbain. Quelques problemes medicaux et sociaux.) Text in French. Courr. Rev. Med. Soc. Enfance, 22(1):6-11, Jan.-Feb. 1972. 9 refs.*

Health problems of children in urban environment are reviewed with special regard to children in marginal populations (migrants and problem families). The lack of green belts, intense traffic, and air pollution, partly due to the former, are among the dangers of urban environment. However, some comparative studies seem to suggest reduced infant, especially prenatal, mortality, accelerated growth, decreased frequency of nutritional and vitamin deficiencies, and of hypotrophy in children in an urban environment, compared to children growing up in the countryside. Notwithstanding the occurrence of chronic respiratory diseases, city children may, to a certain extent, reflect the urban air pollution. Studies concerning the health conditions of a marginal population of North-African migrants living in Paris revealed increased infant mortality (41.8 pro mille against 23 pro mille) as well as non-specific infant pathology in this group. The dominant diseases in such children were tuberculosis, rachitis, chronic respiratory troubles, and hypochromic anemia.

25503 **APTIC NO. 46735**

Truffert, Louis

POLLUTION DUE TO LEAD. *(La pollution saturine.) Text in French. Ann. Fals. Expert. Chim., 65(698):51-104, March 1972. 167 refs.*

Studies concerning the toxicity of lead and the lead content in the human organism, food, water, and air are reviewed. Organic lead compounds such as lead tetramethyl and tetraethyl are much more toxic than inorganic lead compounds, and the toxicity is largely dependent on the solubility. The rate of lead absorption by the organism is fairly high, while the rate of elimination is low, with lead accumulation in the organism and penetration into the tissues as a result. Painter s colic, gastrointestinal and renal troubles, polyneuritis, disturbed sleep, anemia, asthenia, headache, and encephalopathy are the basic symptoms of saturnism. Automotive lead emissions in the form of lead oxide, halogenides, and carbonate are predominantly in fine fractions, with some 60-70% within a range of 0.55-0.70 micron. Atmospheric lead levels and blood lead content in the U.S.A., West Germany, Japan, Italy, Switzerland, and Austria are reviweed. The lead content of the air in Paris ranged from 3.25 to 9.8 micrograms/cu m, while measurements in the consecutive months of 1971 revealed lead content of 0.44-4.27 micrograms/cu m. The monthly averages of the lead fallout in France are 0.47-4.39 mg/100 sq m. The lead content in internal combustion engine fuels should be lowered to 0.00045%. Methods for the determination of lead in the blood and in the air are described.

25504 **APTIC NO. 46838**

Tsulaya, V. R., L. I. Zefirova, and E. A. Pereverzeva

DATA FOR HYGIENIC STANDARIZATION OF ISOOCTANOL IN THE ATMOSPHERE. *(Materialy k gigiyenicheskomu normirovaniyu izooktanola v atmosfernom vozdukhe.) Text in Russian. Gigiena i Sanit., no. 8:16-19, 1972. 4 refs.*

The maximum ineffective and threshold concentrations of isooctanol in the air were determined in human and animal tests. The odor threshold was 0.26 mg/cu m, while a concentration of 0.22 mg/cu m was ineffective. An isooctanol concentration of 0.22 mg/cu caused a significant decrease in the brain potential, but a smaller concentration of 0.15 mg/cu m induced no changes in the bioelectrical brain activity. Male albino rats inhaling isooctanol in a concentration of 1.5 mg/cu m over 96 days developed more or less significant functional and morphological changes (irritability, reduced neuromuscular excitability, reduced blood cholinesterase activity, decreases in the glycogen and ascorbic acid content of the blood, moderate hyperemia of the inner organs with increased permeability of the capillary basal membranes, activation of the reticuloendothelial cells, moderate hypoplasia of the white pulp of the spleen, bronchitis with interstitial reactions, and slight dystrophy of the hepatic parenchyma). No changes in two other groups exposed to 0.15 and 0.08 mg/cu m were observed. The findings recommend a maximum allowable daily average and single-time isooctanol concentration in the atmosphere of 0.15 mg/cu m.

25505 **APTIC NO. 46696**

Yanysheva, N. Ya.

THE SUBSTANTIATION OF THE MAXIMUM PERMISSIBLE CONCENTRATION OF BENZO(A)PYRENE IN THE ATMOSPHERE OF SETTLEMENTS. *(K obosnovaniyu predel no dopustimoy kontsentratsii benz(a)pirena v atmosfernom vozdukhe naselennykh mest.) Text in Russian. Gigiena i Sanit., no. 7:87-91, 1972. 18 refs.*

Maximum allowable concentrations of benzo(a)pyrene were determined in animal tests. Ten doses of the carcinogen were introduced into the trachea of the rats at one-month intervals, and the animals were observed for lung tumors until natural death occurred (36-38 months). Both the animal tests and mathematical calculations revealed direct dose-effect relationship. Prolonged latency periods and reduced frequency of epidermoid carcinomas with reduced doses were also observed. The minimum effective dose of benzo(a)pyrene was 0.1 mg, while the maximum ineffective dose was 0.02 mg, which may, according to calculations, be responsible for a lung tumor frequency of 6.9% at a probability of 0.17%. However, experiments with the maximum ineffective dose, combined with other carcinogenic and non-carcinogenic hydrocarbons and Tween-60, failed to reveal tumor formation in the test animals and their offspring during a three-year-period. Applying a safety factor of 100, the maximum allowable dose of benzo(a)pyrene when introduced into the respiratory tract of the test animals may well be set at 0.0002 mg. An extrapolation of the test data on the human organism suggests a maximum allowable daily benzo(a)pyrene concentration of 0.01 micrograms/100 cu m in the atmosphere of inhabitated areas. Such a concentration might be responsible for a malignant tumor incidence of 1.3 per 100,000 inhabitants yearly.

1971

25506 **APTIC NO. 46559**

Imai, Masayuki, Hidehiko Oshima, Tokiko Kawagishi, Katsumi Yoshida, and Masayoshi Kitabatake

EPIDEMIOLOGICAL STUDIES ON PATIENTS IN RELATION TO AIR POLLUTION IN YOKKAICHI. *(Yokkaichi ni okeru kogai nintei kanja no jokyo). Text in Japanese. Japan J. Hyg. (Tokyo), 26(14):386-393, Oct. 1971. 23 refs.*

A public relief system has been in operation in Yokkaichi since 1965 for patients whose symptoms are regarded to have been caused by air pollution. To date, 710 patients have received treatment under this system. Results of investigations on the present state of these patients show that the chronic obstructive pulmonary diseases tend to increase in relation to the degree of air pollution. Incidence in infants and old age groups is higher than in other age groups, and twice as high in males than in females. In Isozu, the most polluted area in Yokkaichi, the number of new patients increased until 1965, but gradually decreased in parallel with a decrease in pollution level following the construction of high smoke stacks. The peak incidence of bronchial asthma occurred when air pollution began while the peak of chronic and asthmatic bronchitis occurred after 2 to 3 years. Of 49 deaths, 22 resulted from respiratory diseases. The average age was 62.7.

25507 **APTIC NO. 46500**

Miller, James A. and Elizabeth C. Miller

CHEMICAL CARCINOGENESIS: MECHANISMS AND APPROACHES TO ITS CONTROL. *J. Nat. Cancer Inst., 47(3):V-XIV, Sept. 1971. 36 refs. (Presented at the American Association for Cancer Research. Symposium on Mechanisms and Control of Oncogenesis, Chicago, Ill., April 10, 1970.)*

Metabolic activation and reactivity of chemical carcinogens, the relationship between carcinogenic and mutagenic activities of chemicals, possible mechanisms of chemical carcinogenesis, and approaches to the prevention or inhibition of chemical carcinogenesis in man are considered. A number of industrial chemicals, soot, tar, oil, and cigarette smoke are carcinogens.

25508 **APTIC NO. 46848**

Oshima, Hidehiko, Masayuki Imai, and Tokiko Kawagishi

AIR POLLUTION AND MORTALITY IN YOKKAICHI AREA. *(Yokkaichi chiiki ni okeru taiki osen to shiboritsu ni tsuite). Text in Japanese. Nippon Eiseigaku Zasshi (Japan J. Hyg.), 26(4):371-376, Oct. 1971. 10 refs.*

An epidemiological survey was carried out in the Yokkaichi area of Japan, from 1961 to 1970, to determine the relationship between air pollution and mortality. The death rate from obstructive respiratory diseases, especially bronchial asthma and emphysema, increased in the polluted area beginning in 1966, and a significant difference in death rates was noted between the polluted and non-polluted areas. Mortality from these diseases can be correlated with sulfur dioxide concentrations in 1968 and 1969. Deaths from bronchial asthma occurred at younger ages in the polluted areas, while deaths from emphysema were not encountered among women in the non-polluted areas.

25509 **APTIC NO. 46510**

Tkachev, P. G.

HYGIENIC ASSESSMENT OF THE EFFECT OF INHALATION OF SMALL CONCENTRATIONS OF ALIPHATIC ETHYLAMINES. *(Gigiyenicheskaya otsenka ingalyatsionnogo vozdeystviya malykh kontsentratsiy alifaticheskikh etilaminov). Text in Russian. Gigiena i Sanit., 36(9):8-11, 1971. 12 refs.*

The effects of short-term inhalation of mono-, di- and triethylamine on humans are reported, as well as an animal experiment in which these substances were introduced into the body for 24 hr. Hygienic standards for the permissible content of ethylamines in the atmosphere are suggested.

EFFECTS-PLANTS AND LIVESTOCK

1972

25510 **APTIC NO. 46789**

Brandt, C. Jeffrey and Richard W. Rhoades

EFFECTS OF LIMESTONE DUST ACCUMULATION ON COMPOSITION OF A FOREST COMMUNITY. *Environ. Pollut., no. 3:217-225, July 1972. 10 refs.*

Two sites in southwestern Virginia were sampled to determine the effects of dust accumulation on structure and composition of a forest community. Compared with the control site, significant changes in structure and composition had occurred in the seedling shrub and sapling strata of the experimental site, which had heavy accumulations of dust from limestone processing plants. Dominance in the tree stratum was also changing. Leading dominants in the control site were Quercus prinus, Q. rubra, and Acer rubrum, whereas those in the dusty site were Quercus alba, Q. rubra, and Liriodendron tulipifera. Species expected to assume ultimate dominance in the experimental site, if dust accumulation continues, are L. tulipifera, Acer saccharum, and, possibly, Quercus muehlenbergii. (Author abstract modified)

25511 **APTIC NO. 46584**

Daessler, Hans-Guenther

VEGETATION DAMAGE AS CONSEQUENCE OF AIR POLLUTION. *(Vegetationsschaeden als Folge der Luftverschmutzung). Text in German. Wiss. Z. Tech. Univ. Dresden, 20(4):1171-1173, 1972.*

In the German Democratic Republic about 10 to 15 million tons of fly ash are emitted each year, as well as 2.5 million tons of sulfur dioxide. In the Leipzig-Altenburg area the daily SO2 emissions amount to about 1400 tons. A concentration of 0.2 mg SO2/cu m air damages vegetation. Various stages of injuries must be distinguished. Functional disturbances in the assimilation organs are not visible. Chronic damages are accompanied by a drop of the harvest yield. Acute injuries are indicated by heavy necrosis. The largest area of injured forest is the industrial center around Halle-Leipzig and Dessau. Constant exposure to high SO2 concentrations caused extensive injuries of pines in the Duebener Heide. The injured forest spans 60,000 hectars. Another injured forest stretched from the central and Eastern Erzgebirge to the Elbsandsteingebirge. This area spans 15,000 hectars. Moreover, forest injuries were also observed in the industrial area between Aue, Zwickau, and Karl-Marx Stadt. The forest in the Werra and Unstrut area suffers from emissions by the potassium industry. The injuries in the forest around Cottbus have worsened. The German Democratic Republic has 220,000 hectars of emission injured forests, of which 30,000 hectares are so heavily injured that no coniferous trees will grow any more. The major effort for reducing the emissions must come from the industry. They must make greater use of available cleaning systems. Forestry can contribute only by planting more resistant species.

25512 **APTIC NO. 46888**

Facteau, T. J. and S. Y. Wang

THE EFFECTS OF AQUEOUS SPRAYS OF NH4F ON EARLY IMPROVED ELBERTA PEACHES. *Hortscience, 7(5):505-506, Oct. 1972. 6 refs.*

Aqueous sprays of ammonium fluoride applied to Early Improved Elberta peach trees significantly increased the percentage of abnormal fruits. Tissue firmness was increased on the dorsal side but decreased on the suture side. Suture tissues contained more F than dorsal tissues and both had higher F levels as the F spray concentration increased. The climacteric of treated fruits was initiated before the untreated fruits at every sampling date where a climacteric occurred. Both malic and citric acids were decreased in the suture tissues of F treated fruits. (Author abstract)

25513 **APTIC NO. 46446**

Hopkinson, J. M., R. H. Wilson, and B. N. Smith

LEAD LEVELS IN PLANTS. *Naturwissenschaften (Berlin), 59(9): 421-422, 1972. 6 refs.*

The use of tetraethyl lead in gasoline has been the major factor responsible for the tremendous rise in atmospheric lead concentrations since the 1920s. As a result, lead contamination has increased along roadsides, in urban areas, and in roadside plants. Plant samples were taken along a highway two miles south of Austin, Texas in Aug. 1970. After drying and ashing, plant samples were analyzed with an atomic absorption spectrophotometer for lead. The levels of lead decreased with increasing distance from the highway. Plants taken 32 m northwest of the road contained less than 1/2 as much lead as plants adjacent to the road. More lead was found in plants on the northwest side of the road than on the southeast due to prevailing winds. Different species had different capacities to accumulate lead.

25514 **APTIC NO. 46579**

Kadota, Masaya and Kaoru Ohta

OZONE SENSITIVITY OF JAPANESE PLANT SPECIES IN SUMMER, WITH SPECIAL REFERENCE TO A TENTATIVE SENSITIVITY GRADE LIST FOR APPLYING TO FIELD SURVEY ON OZONE INJURY. *(Honpo-san shokubutsu no kaki ni okeru ozon higai no kyojaku -- toku ni ozon-gai ni kansuru yagai chosa no hojo to shite no zanteiteki higaido risuto). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 7(1):19-26, 1972. 7 refs.*

Over 30 species of Japanese plants were exposed to 0.25 ppm of ozone for 5 hours daily to determine their ozone sensitivity and to supply data for a sensitivity grade list for use in field tests on ozone injury. Injury due to ozone was usually restricted to the mature leaves. The initial lesion of the leaf was in the palisade cell layer, sometimes extending to the spongy cell layer and to the underlayer. Injury grade was assessed on the basis of time periods required to produce incidental spot-like lesions on the upper surface of about 5% of the leaves. A tentative sensitivity grade list is presented for over 70 plant species.

25515 **APTIC NO. 46855**

Leh, H.-O.

POLLUTION OF PLANTS BY LEAD FROM AUTOMOBILE EXHAUST GASES. *(Verunreinigung von Pflanzen durch Blei aus Kraftfahrzeugabgasen). Text in German. In: Blei und Umwelt. Kommission fuer Umweltgefahren des Bundesgesundheitsamtes (West Germany), Arbeitsgruppe Blei, p. 38-48, 1972. 39 refs.*

Leaded gasolines have lead to extensive lead pollution of the environment. The exhaust gases of 1000 cars emit 30 g Pb/km based on a gasoline consumption of 10 l/100 km, a Pb concentration in the gasoline of 0.4 g/l of which 75% are in the exhaust gases. In Switzerland, 700 tons of lead were emitted into the atmosphere with the exhaust gas in 1968, in the Netherlands 800 tons. In the Northern Hemisphere, the Pb emissions reach more than 500,000 t/yr. In the vicinity of busy streets and highways, the vegetation is considerably polluted by lead. The influence of traffic is clearly discernible to a distance of about 100 m on both sides of the highway. The extent of lead contamination is determined from the traffic density, the closeness to the highway, the exposure time, the surface structure of the leaves, the position of the leaves (vertical, horizontal), the quantity and distribution of precipitation, the wind direction, and wind strength. Above-ground parts of the plants are more contaminated than underground parts. Part of the above-ground lead on plants can be washed off. The lead intake of humans is estimated to amount 1.2 to 2.2 mg/day.

25516 **APTIC NO. 46788**

Little, P. and M. H. Martin

A SURVEY OF ZINC, LEAD AND CADMIUM IN SOIL AND NATURAL VEGETATION AROUND A SMELTING COMPLEX. *Environ. Pollut., no. 3:241-254, July 1972. 19 refs.*

Analysis of samples of leaves and soil collected in the Avonmouth area of Severnside, Great Britain, showed the distribution of airborne zinc, lead, and cadmium to be strongly affected by prevailing wind conditions. Levels of zinc, lead, and cadmium in elm leaves collected in October 1971 ranged from 8000, 5000, and 50 ppm dry matter close to a smelting complex, to values of about 200, 100, and less than 0.25 ppm, respectively, at distances of 10-15 km from the factory. The Avonmouth industrial complex includes the largest lead and zinc smelting plant in the world. Determinations of metal content were made using an atomic absorption spectrophotometer, and results of the analyses are presented in the form of concentration contour maps. (Author abstract modified)

25517 **APTIC NO. 46605**

Matsushima, Jiro

THE EFFECTS OF PHOTOCHEMICAL REACTION SUBSTANCES ON PLANTS. *(Kokagaku hanno busshitsu no shokubutsu ni oyobosu eikyo). Text in Japanese. Japan Society of Air Pollution, Proc. Japan Soc. Air Pollut., Meet. Air Pollut. Caused Photochem. Reaction, 1972, p. 171-181. 38 refs.*

The effects of airborne pollutants on plants are discussed. Since the photochemical substances contain mostly ozone, it is believed that plant damages are mainly due to the action of this product. Brown spots appear on all leaves of tobacco plants exposed to 0.11 ppm O3. Classes which have highest sensitivity to O3 are Avena, Lycoperisicum, Nicotiana, Phaseolus, Pinus, Poa, Polygonum, Solanum and Spinacea. Avena, Phaseolus, Poa, Lycoperisicum, Petunia, Dahlia, Latuca, Brassica, and Urtica, are also sensitive to peroxyacetyl nitrate. At 14 ppb for 4 hours, these plants all showed injuries. Nitrogen dioxide and sulfur dioxide showed significant synergistic effects on the injuries of leaves of Lycoperisicum.

25518 **APTIC NO. 46557**

Mooi, J

INVESTIGATION OF THE SUSCEPTIBILITY OF WOODY PLANTS FOR SO2 AND HF. *(Onderzoek naar de gevoeligheid van houtige gewassen voor SO2 en HF). Text in Dutch. Groen, 1972:1-12, Jan. 1972.*

The equipment for fumigation of woody plants in the field developed by Spierings was improved by mounting feelers to the fumigation gun in order to measure climatic conditions. The data from these feelers is registered automatically on instruments situated in a van and worked out by a computer. The equipment is used for short-time fumigations in the field. Short-time fumigations were also carried out in the laboratory. The data and symptoms of damage to the trees and shrubs caused by low concentrations of sulfur dioxide and hydrogen fluoride are discussed. In a fumigation experiment with a concentration of 2.41 ppb HF applied during 4 months, trees and shrubs showed a great difference in susceptibility to and capacity for uptake of HF.

25519 **APTIC NO. 46853**

Musche, R.

THE LEAD CONCENTRATION IN FOOD. *(Bleigehalte in Lebensmitteln). Text in German. In: Blei und Umwelt. Kommission fuer Umweltgefahren des Bundesgesundheitsamtes (West Germany), Arbeitsgruppe Blei, p. 58-61, 1972. 5 refs.*

The lead concentrations measured in basic food (e.g., milk 0.01 to 0.59 mg/l and eggs 0.02 mg/l) and in prepared food are listed in tables. The lead-containing waste gases in the atmosphere near highways lead to higher lead residues on the food. This lead leads mostly to an external contamination of plants. The quantity of lead residues on and in such plants drops with increasing distance from the highways, the difference of the lead which can be removed by washing and the residual in the plant drops too. To give an example, the lead concentrations on unwashed leaves growing 5 m from a highway in the Ruhr area fluctated between 41.5 and 64.5 micrograms/g dry substance, in washed plants between 38.4 and 41.5 micrograms/g dry substances; at a distance of 10 m the concentrations fluctuated between 31.6 and 43 micrograms/g dry substance for unwashed leaves and between 34.8 and 40.8 micrograms/g dry substance for washed leaves. At 50 m, the concentrations dropped to between 18.5 and 37.9 micrograms for unwashed and to between 14.9 and 35.8 micrograms/g dry substance for washed leaves. The measurements were taken in 1964.

25520 **APTIC NO. 46802**

Nash, Thomas H., III

SIMPLIFICATION OF THE BLUE MOUNTAIN LICHEN COMMUNITIES NEAR A ZINC FACTORY. *Bryologist, 75(3):315-324, 1972. 16 refs.*

The effect of zinc factory emissions on lichen communities was investigated. In Lehigh Water Gap near a zinc factory, species diversities of corticolous, saxicolous, lignicolous, and terricolous lichen communities were markedly reduced as compared to the specied diversities of lichen communities in Delaware Water Gap. Nine lichen species were found in Lehigh Water Gap; 84 were found in Delaware Water Gap. Foliose, fruticose, and crustose species, respectively, were increasingly more tolerant of the conditions around the zinc factory. The effect of factory emissions on the lichen flora was discernible up to 6 km to the west and 15 km to the east of Lehigh Water Gap. (Author abstract modified)

25521 **APTIC NO. 46923**

Navara, Jan

VARIATIONS IN THE INTENSITY OF TRANSPIRATION AND DAMAGE TO PLANTS CAUSED BY FLUORINE PRESENT IN THE ATMOSPHERE. *(Zmeny v intenzite transpiracie a poskodenie rastlin pri posobeni fluoru z ovzdusia). Text in Slovak. Biologia (Bratislava), 27(7): 545-559, 1972. 30 refs.*

The effect of various atmospheric fluorine concentrations on transpiration intensity and the health of leaves of 10-day-old plants of Pisum sativum was studied under conditions of continuous and periodic fumigation. Transpiration intensity was determined gravimetrically by a special apparatus. Low fluorine concentrations (50 ppb), following a temporary drop in water transpiration, resulted in a marked increase in transpiration. Following the attainment of maximal increase, transpiration decreased again to end up shortly before the appearance of visible leaf damage at lower intensity than control plants unexposed to fluorine. Higher concentrations (100-150 ppb) led immediately to a gradual drop of transpiration intensity which continued throughout the stage of invisible and visible leaf damage. Lower and higher fluorine concentrations also affected the appearance of leaf damage. Leaf necrosis appeared sooner at higher, later at lower, fluorine concentrations. At lower concentrations, upper ontogenically younger leaves turned light brown which was followed by peripheral necrosis on fully developed leaves. Concentrations of 150 ppb caused a different type of damage: after one day of fumigation, the leaves began to wilt. Transpiration intensity at high fluorine concentrations dropped more markedly in plants growing at relatively lower humidity, at higher relative humidities the effect of fluorine was less noticeable. Periodic fumigation disclosed that at night plants were more sensitive to the effect of fluorine than during the day: transpiration intensity dropped more.

25522 **APTIC NO. 46460**

Pell, Eva Lindauer

THE ADENOSINE TRIPHOSPHATE TO TOTAL ADENYLATE STATUS OF OZONATED PINTO BEAN FOLIAGE AND ITS RELATION TO PHOTOSYNTHESIS AND RESPIRATION. *Rutgers-The State Univ., New Brunswick, N. J., Dept. of Biology, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., Jan. 1972, 114p. 60 refs.*

Pinto bean plants were exposed to 0.25-0.30 ppm ozone for 3 hr. Immediately after ozonation when visible symptoms were not yet apparent, primary leaves of control and treated bean leaves were harvested for determination of ATP, total adenylate content, and respiration and photosynthesis rates. A repeatable, accurate method of ATP extraction was developed for use with pinto bean foliage. Adenosine diphosphate (ADP) and adenosine monophosphate (AMP) were converted to ATP with ATP:creatine phosphotransferase, and total adenine nucleotides were then analyzed by the luciferin-luciferase technique. Oxygen uptake and evolution were reported in microliters oxygen per hour per milligram dry weight. In three out of four experiments there were no symptoms of ozone toxicity immediately after exposure but symptoms did develop after 24 hr. The ozonated bean leaf tissue that was harvested immediately had significantly higher concentrations of ATP and total adenylates than did control tissue, and the ratios of ATP to total adenylate content remained unchanged. In two out of three of these experiments the respiration rates of ozonated leaves remained unchanged, but in the third, it increased significantly. Photosynthesis of treated pinto bean leaves decreased significantly in all experiments. In the fourth experiment visible symptoms did not develop even after 72 hours. In this case ATP, total adenylate content, and respiration rates of ozonated tissue remained the same as that of the control, whereas photosynthesis decreased. A kinetic study was conducted to determine whether there was any direct relationship between ozone-induced changes in photosynthesis, respiration, and adenine nucleotides and whether these changes persisted as the symptoms developed. The ozone toxicity symptoms began to develop within 21 hr, becoming prominent in all samples within 72 hr. The ATP content of ozonated pinto bean leaves was significantly higher than that of the controls at 0, 6, and 72 hr but not at 21 hr after ozonation. The increase in total adenylates in pinto bean leaves observed immediately after ozonation persisted through the 21-hour period. The ratio of ATP to total adenylate content was not affected by exposure to ozone. Respiration increased significantly in ozonated pinto bean leaves and the increase became greater as the symptom developed. The decrease in photosynthesis observed immediately after ozonation persisted for 6 hr, but photosynthesis returned to normal by 21 hr. (Author abstract modified)

25523 **APTIC NO. 46900**

Prince, Rosemary and F. F. Ross

SULPHUR IN AIR AND SOIL. *Water, Air, Soil Pollut., 1(3):286-302, July 1972. 33 refs.*

The sulfur needs of vegetation, natural sources of airborne S, anthropogenic emissions, manufactured S, maximum permissible concentrations, emissions and concentrations, sulfur dioxide absorption, S in precipitation, S loss in drainage, and future trends are discussed. Natural S supplies are insufficient for high crop yield. The S brought down by rain is limited, even in industrial areas, and much of it is lost in drainage. Additional supplies are needed either as fertilizers or as sulfur dioxide, which vegetation readily absorbs. The margin between the minimum SO2 concentration for full growth and the concentration at which damage occurs is wide enough for distribution via the air, without deleterious effects, of such S as is available from the combustion of fuels. The three major questions where more precise quantification is required relate to urban pollution, absorption by land and water surfaces, and long distance drift. Suggestions for future research are given. (Author abstract modified)

25524 **APTIC NO. 46793**

Sharp, E. L.

RELATION OF AIR IONS TO AIR POLLUTION AND SOME BIOLOGICAL EFFECTS. *Environ. Pollut., no. 3:227-239, July 1972. 10 refs.*

High concentrations of large air ions were associated with the reduced germination percentage of uredospores of Puccinia striiformis. Concentration of large ions during the period of spore hydration (the first hour) was most critical in determining germination percentage. One of the main sources of large air ions appeared to be combustion nuclei from automobile exhaust. Aitken nuclei and atmospheric lead also increased due to this source. Some wheat varieties inoculated with P. striiformis uredospores during an extended temperature inversion period, which resulted in especially high concentrations of large ions, showed shifts toward greater resistance and the incubation period was prolonged by about four days. Air ion monitoring, combined with germination bioassay, was used at different locations to assess relative air quality. (Author abstract)

25525 **APTIC NO. 47055**

Showman, Ray E.

RESIDUAL EFFECTS OF SULFUR DIOXIDE ON THE NET PHOTOSYNTHETIC AND RESPIRATORY RATES OF LICHEN THALLI AND CULTURED LICHEN SYMBIONTS. *Bryologist, 75(3):335-341, Fall 1972. 20 refs.*

The physiological effects of sulfur dioxide exposure on several common lichens and their isolated symbionts were investigated. Sulfur dioxide exposure decreased net photosynthesis and respiration in the cultured lichen; physiological responses at the same SO2 exposure were different for whole thalli, and the mycobionts of the three lichen species were also differentially sensitive. Chlorophyll damage was not noted in the exposed phycobionts. (Author abstract modified)

25526 **APTIC NO. 46600**

Veres, Imre, Janos Czibulya, Tibor Ravasz, Zoltanne Boszormenyi, and Andras Ochenyi

PHYSICAL, CHEMICAL AND AGRICULTURAL INVESTIGATIONS OF FLY ASH ORIGINATING FROM OIL-FIRED EQUIPMENT, WITH SPECIAL REGARD TO THE DAMAGING EFFECT ON THE ENVIRONMENT. *(Olajtuzelesbol szarmazo pernyek fizikai, kemiai es mezogazdasagi vizsgalata, kulonos tekintettel a kornyezetkarosito hatasra). Text in Hungarian. Energia Atomtech. (Budapest), 25(7):318-321, 1972. 9 refs.*

Physical and chemical investigations and greenhouse tests performed with fly ash samples from a large-capacity, oil-fired thermal power plant, are described. The vanadium content, determined by a colorimetric method, ranged from 3.82 to 4.14%, and the nickel content was determined by a gravimetric method as 0.59-0.62%. The bulk of the fly ash belonged in a fraction of 0.06-0.10 mm. A spherical, soot-like fraction and a mineral fraction with silica, iron oxides, and alkali earth metals as main components were distinguished by morphological investigations. The soot fraction, composed of spheres with smooth surface with limited adhesion, represents minor environmental, including corrosion, hazards, while the mineral fraction which contains hard, abrasive particles of very irregular shape with large specific surface may produce slight silicosis in man and animals, and plug the stomata in plants. In addition, this fraction represents low-temperature corrosion hazards due to the presence of tetravalent vanadylsulfate and free sulfuric acid. Greenhouse tests with overdosed fly ash revealed white mustard (Brassica hirta) to be most sensitive for fly ash, which thus may be used as an indicator plant. The damage is also dependent on the water supply. The fairly high resistivity of leguminous species, especially of bean, may be due to the stimulating effect of vanadium and the increased heat absorption through the fly ash buildup.

1971

25527 **APTIC NO. 46688**

Berry, Charles R.

RELATIVE SENSITIVITY OF RED, JACK, AND WHITE PINE SEEDLINGS TO OZONE AND SULFUR DIOXIDE. *Phytopathology, 61(2):231-232, 1971. 4 refs.*

Groups of red pine, jack pine, and eastern white pine seedlings at ages 3, 5, and 7 weeks were exposed to individual dosages of 25 to 50 pphm of ozone and sulfur dioxide to dertermine their relative sensitivity. Jack pine was the most sensitive to ozone. None of the species was sensitive to SO2 at the 25 pphm level. At the 50 pphm level, red pine was the more tolerant to SO2. Ozone was more injurious to all three species than was SO2. (Author abstract modified)

25528 **APTIC NO. 46719**

Keller, Theo and H. Schwager

THE DETECTION OF HIDDEN F-INJURY OF FOREST TREES BY A SIMPLE COLORIMETRIC DETERMINATION OF PEROXIDASE ACTIVITY. *(Der Nachweis unsichtbarer (physiologischer) Fluor-Immissions-schaedigungen an Waldbaeumen durch eine einfache kolorimetrische Bestimmung der Peroxidase-Aktivitaet). Eur. J. Forest Pathol., 1(1):6-18, 1971. 26 refs. Translated from German. 21p.*

A simple routine method is described for colorimetrically determining peroxidase activity in foliage of forest trees, including conifers. Peroxidase activity increases with aging of tissues. Fluoride emissions add to this natural tendency, thus leading to premature senescence; the increased fluoride content in assimilation organs is associated with increased peroxidase activity. External dust influences peroxidase activity only after several hours, while peroxidase activity is very little affected by variations in tissue water content. An analysis of potted plants exposed at varying distances from an aluminum plant and fluoride emissions indicates that peroxidase activity and the fluoride content of foliage increases with decreasing distance. Increased peroxidase activity may occur without or before symptoms of visible fluoride injury develop. (Author summary modified)

25529 **APTIC NO. 46607**

Spierings, F. H. F. G.

INFLUENCE OF FUMIGATIONS WITH NO2 ON GROWTH AND YIELD OF TOMATO PLANTS. *Neth. J. Plant Pathol., vol. 77:194-200, 1971. 4 refs.*

Prolonged and short-lasting fumigations with nitrogen dioxide were carried out with tomato plants. Very young plants showed an increase in length as a consequence of fumigations with 0.5 ppm for ten days. A concentration of 0.4-0.5 ppm applied during a period of 21-45 days also resulted in an increase in length and gave rise to the development of smaller leaves and shorter leaf petioles. Fumigations with a concentration of 0.25 ppm during the entire growth period caused a decrease in crop yield of 22%. (Author abstract)

EFFECTS-MATERIALS

1972

25530 **APTIC NO. 46898**

Gadda, E., M. Livraghi, and V. Regis

CHARACTERIZATION BY THE ELECTRON MICROPROBE, OF THE SCALES ON LOW ALLOY STEELS EXPOSED TO COMBUSTION GASES. *(Caracterisation a l aide de la microsonde electronique des couches de corrosion sur aciers faiblement allies exposes aux gaz de combustion). Text in French. Werkstoffe Korrosion, 23(10):893-901, 1972. 3 refs.*

Some low alloyed 13 chromium-molybdenum-oxygen 44 steel samples were exposed to flue gases of an experimental furnace burning low-sulfur content fuel oil. Thirty percent excess air tests were carried out for 1000 hours. Corrosion scale was characterized by electron microprobe analysis. Distribution and concentration profiles of basic elements such as iron, oxygen, chromium, sulfur, vanadium, sodium, and calcium were obtained. The presence of sulfur and chromium enrichment in the first corrosion layer, mainly at the metal-oxide interface, are discussed in connection with their influence on the layer properties.

25531 **APTIC NO. 46812**

Heimler, Bo and Nils-Gasta Vannerberg

A MICROSCOPIC STUDY OF STEEL SURFACES EXPOSED TO A HUMID SO2-CONTAINING ATMOSPHERE. *Corrosion Sci., 12(7):579-582, 1972. 7 refs.*

Electropolished and etched steel samples were exposed to a humid, sulfur dioxide-containing atmosphere under controlled conditions. Surface structure of the samples and the distribution of the points of attack after exposure were studied with a scanning electron microscope. Grain boundaries were not necessarily potential sites of attack in the initial stage of atmospheric corrosion. Other factors, such as the adsorption of water molecules and the distribution of electrolyte over the metal surface, were of greater importance in determining the positions of the points of attack. (Author abstract modified)

25532 **APTIC NO. 46588**

Hodlova, Miluse

MODELLING OF THE POLLUTION OF OUTDOOR HV INSULATORS. *(Modelovani necistot izolatoru vvn do venkovniho prostredi). Text in Czech. Elektrotech. Obz., 61(7):357-360, 1972. 4 refs.*

Dirt accumulations on outdoor high voltage (HV) insulators, caused by air pollution, can lead to disruptive discharges, particularly if the accumulation is unevenly distributed. One way of reducing the probability of the occurrence of such discharges is the choice of design of the insulator. A method is described for judging various forms of HV outdoor insulators for use in a polluted atmosphere. The method uses models and is based on electrical analogy. It is relatively simple and suitable for the analysis of a number of variations in dirt accumulation, for instance dirtiness of the upper or lower part of the insulator and irregular distribution of dirtiness. A conductive graphite paper can be used as a basic material for the model. For the purpose of defining the optimal design of the insulator, measurements of comparative field strengths at various conditions of simulated dirtiness were taken, and the results plotted on graphs. By using a plane model, instead of a three-dimensional one, the procedure is greatly simplified, since only comparative measured values are required for determination of the optimal shape.

25533 **APTIC NO. 46680**

Krylov, S. V. and A. S. Shamsiyev

WET DISCHARGE CHARACTERISTICS OF INSULATORS IN POLLUTED ATMOSPHERE. *(Vlagorazryadnyye kharakteristiki izolyatorov v usloviyakh zagryazneniy). Text in Russian. Elektr. St. (Moscow), no. 8:62-67, Aug. 1972. 8 refs.*

The wet discharge characteristics of strain and spreader insulator chains exposed to different types of polluted atmospheres were studied in a long-term experiment. The insulators were wetted periodically with water spray until minimum surface resistance was reached. The rate of soiling of the insulator surface in the strain link was lower by 1.5-2 times than in the spreader chain, while the wet discharge voltages were higher by 10-15%. The rate of soiling was dependent on meteorological factors prevailing in a given area, and on the specific design of the insulator surface. The rate of buildup formation on the upper surfaces of glass disk insulators was higher by 30-50% than on corresponding porcelain insulators. Lower perpendicular ribs resulted in increased soiling, while inclined lateral ribs improved the aerodynamic characterictics of the insulators. A complex, convex surface is favorable for an effective self-cleaning during intense precipitation. The correction factors for the flow path should be determined in field tests in the specific environment in which the insulators will be used.

25534 **APTIC NO. 46916**

Nishikawa, Takeshi

MANUFACTURING METHOD OF POROUS, THIN FILM. *(Takoshitsu usumaku no seizohoho). Text in Japanese. (Sumitomo Electric Industry, Ltd., Osaka (Japan)) Japan. Pat. Sho 47-44418. 3p., Nov. 9, 1972. 2 refs. (Appl. June 20, 1967, 1 claim).*

An anodic oxidation method by which a very thin, porous film can be manufactured electrically from a 50-micron thick aluminum foil is discussed. Treated by the patent anodic oxidation method, aluminum has an alumite layer formed on its surface, thus acquiring higher anti-corrosion ability and hardness. Crystal pillars of the alumite layer each have a fine center pore. The pore is not a through-hole, however, due to the central barrier of aluminum foil which is unbreakable by the ordinary anodic oxidation method, since electric current applied to perform the anodic oxidation sharply drops in 2 hours or so after the start and, as a result, the alumite process does not continue. The central barrier can be perforated by continuously applying the initial voltage between the anode and cathode for a certain length of time following the sharp current drop during the anodic oxidation process. Number of the pores formed in the foil by the anodic oxidation is between 10 to the 9th and 10 to 11th power per sq m. Observed by an electron microscope and other methods, the pore diameter ranged from 50 to 800 A and the porosity from 5 to 46%.

25535 **APTIC NO. 46665**

Sauman, Zdenek

EFFECT OF CO2 ON POROUS CONCRETE. *Cem. Concr. Res., 2(5):541-549, Sept. 1972. 12 refs.*

The effect of carbon dioxide on porous concrete under varying storage conditions of relative humidity was investigated. The degree of carbonization was proportional to the CO2 concentration, the humidity of the environment, and the storage period. The main binding component, 11 A-tobermorite, started decomposing during the first 7 days in all the environments studied. Within 30 days storage in 10 and 30% CO2 and 50, 75, and 100% relative humidity, the tobermorite was completely decomposed. The most significant reduction in compressive strength was noted at these conditions. Shrinkage of porous concrete was proportional to CO2 concentration and storage time; relative humidity was of substantially lesser effect. (Author conclusions modified)

25536 **APTIC NO. 46704**

Tamada, Akihiro

LONG TERM PERFORMANCE OF LOW ALLOY STEELS IN THE ATMOSPHERE. *(Cho nengetsu taiki bakuro ni yoru kozai no fushoku ni tsuite). Text in Japanese. Boshoku Gijutsu (Corrosion Engineering, Tokyo), 21(7):309-316, July 1972. 7 refs.*

The effect of industrial and rural atmospheres on the corrosion potential of 117 low alloy steels over 8 and 12 years was investigated in Japan. Carbon steels corroded 4 times more in the industrial atmosphere than in the rural atmosphere. In the industrial atmosphere, the degree of corrosion resistance was greatest in platinum alloys, followed in decreasing order by copper, molybdenum, chromium, and silicon alloying elements. In the rural atmosphere, platinum was again most resistant, followed in decreasing order by copper, silicon, chromium, and nickel. Based on the data, the effect of alloying elements was quantified by multiple regression analysis and formulas for weight loss and exposure year and corrosion loss for 20 years were calculated. The surface rust of the weathering steels was a thin uniform layer; alloy-rich special structured layers were not detected.

25537 **APTIC NO. 46932**

Trenkler, H.

SOME ASPECTS CONCERNING THE ADHESION OF SCALES ON STEELS AT HIGH TEMPERATURES. *(Einige Gesichtspunkte zur Haftung von Zunder auf Staehlen bei hoher Temperatur). Text in German. Werkstoffe Korrosion, 23(10):870-875, 1972. 9 refs. (Presented at the Arbeitstagung Mechanische Eigenschaften und Haftung von Zunderschichten und ihr Einfluss auf die Oxydation von Metallen, Duesseldorf, West Germany, Dec. 16-17, 1971.)*

Under hot rolling conditions (about 1000 C), the experimental determination of the adhesion of scales is difficult, so no statement can be made as to the degree of purity of the rolled material's surface. The difficulties are due to the fact that the condition of scale/steel interface is very different. The rougher the interface, the better the scale adhesion. Temperature is thus very important -- the interface of steel scaled at 1000 C is much rougher than the surface of pure iron, while no difference can be found at 1200 C. Sulfur dioxide in the atmosphere can also contribute to surface roughness, mainly because of the formation of liquid phases and the strong grain boundary ionization connected therewith. Minor element additions (carbon, silicon, copper) are important too, but no clear statement can be made as to the influence of any individual element on combinations thereof.

EFFECTS-ECONOMIC

1972

25538 **APTIC NO. 46387**

COSTS AND EFFECTS ON PRICES OF ENVIRONMENTAL PROTECTION. *(Kosten- und Preiseffekte des Umweltschutzes). Text in German. Chemiker Ztg. (Heidelberg), 96(8):470-471, 1972.*

According to an investigation of the Organization for Economic Cooperation and Development (OECD) which bases on presently existing, national programs, up to 3% of the gross national income will be appropriated for environmental protection by the year 1975. The costs for the maintenance of clean air and water can be broken down into investment costs for the construction and expansion of protection facilities, costs for maintenance, and costs for research work for the development of new processes which pollute the environment as little as possible. For compliance with the maximum allowable emissions for sulfur dioxide and carbon monoxide as demanded by the U. S. Clean Air Act costs and prices will rise. The extent of the rise can be shown by the following examples: in the non-ferrous metal industry prices will go up by 16.8%, for power production by 7.3%, for iron and steel production 3.5%, for chemical products 0.4 to 0.8%, and for refinery products 1.2%. In the Federal Republic of Germany environmental protection will cost 10 billion dollars until 1975. The costs for environmental protection will be so high that the market regulating forces in international trade will not be enough to bring about a balance. Some compensatory fee will have to be collected until an international agreement on environmental protection is reached.

25539 **APTIC NO. 46400**

PLATINUM HAS A GLOWING FUTURE. *Chem. Week, 111(7):31, Aug. 16, 1972.*

Full adoption of catalytic automobile exhaust control devices would more than double the demand for platinum. Prospects of this $150-million market have sent dealer platinum prices soaring from $103/tr oz in May to $150. The automobile industry has been moving toward the platinum-based converter at a cautious pace because of price and supply factors and the danger of fouling the catalyst if a car runs out of gas or if the engine is used for braking. Despite these drawbacks, platinum is the most probable catalyst material, since emission control devices must be ready for the 1975 cars to meet pollution control regulations. Chemical producers, oil refiners, and automobile manufacturers would prefer a cheaper alternative to platinum.

25540 **APTIC NO. 46962**

Commoner, Barry

THE ENVIRONMENTAL COST OF ECONOMIC GROWTH. *Chem. Brit., 8(2):52-65, Feb. 1972. 21 refs.*

A semi-quantitative evaluation of the environmental costs of economic growth in the United States since the 1940s is given, and, in the light of it, it is suggested what all modern industrial countries must do in order to survive economically as well as biologically. The environmental cost of a given economic process is represented by its environmental impact, a term which has the dimensions of the amount of an agency external to the ecosystem which, by intruding upon it, tends to degrade the system's capacity for self-adjustment. Origins of environmental impacts, the impact of economic growth, agricultural production, textiles, detergents, secondary environmental effects of technological displacements, packaging, automotive vehicles, and an environmental impact inventory are discussed.

25541 **APTIC NO. 46693**

Gutow, Bernard S.

IMPACT OF FOUNDRY POLLUTION CONTROL. Environ. Sci. Technol., 6(9):790-793, Sept. 1972. 1 ref.

The principal environmental problem of the iron foundry industry is air pollution caused largely by melting operations. Emission control costs, measured against such factors as sales, total assets, and cost per ton of castings, generally show a declining percentage as foundry size increase. A greater emission control burden, therefore, is placed on the smaller foundries and may contribute to reasons for foundry closures. The high capital costs involved in melting, mechanization, automation, and pollution and environmental control have accelerated the rate of closing of small foundries. The effect of environmental control on the cost of casting varies from more than $14/t for the smallest foundries to under $2/t for the largest foundries. Pollution controls also result in price increases on some products sold directly to the consumer. The principal effect of the closing of foundries will be on local employment and to a lesser degree on national employment.

25542 **APTIC NO. 46774**

Pfeiffer, Brant A. and Ronald D. Gilbert

POLLUTION ABATEMENT EXPENDITURES BY THE ELECTRIC POWER INDUSTRY. *Pub. Util. Fortn., 90(5):21-28, Aug. 31, 1972. 20 refs.*

Pollution abatement programs and expenditures by the electric power industry are reviewed. Electric power generation is the largest stationary source of air pollution in the United States, accounting for 13% of all aggregate tonnage or 50% of the sulfur dioxide emissions, 27% of the nitrogen oxide emissions, and 30% of the particle emissions. Available control technologies, including electrostatic precipitators, low-sulfur fuels, scrubbers, catalytic oxidation, by-product recovery and recycling, add greatly to the costs of power generation and often create problems for the operation schedules. Nuclear reactors are a potential power source; the problem, however, changes from one of air pollution to thermal pollution. Costs incurred and projected by over 30 firms are tabulated.

25543 **APTIC NO. 46397**

Wett, Ted

PETROCHEMICAL FEEDSTOCKS FACE ECOLOGY/ENERGY PINCH. *Oil Gas J., 70(36):95-98, Sept. 4, 1972.*

Aromatic hydrocarbon supplies should be sufficient once refiners are fully geared to meet low or no-lead gasoline requirements. However, another octane race after lead is removed will put a price pinch even on aromatics. The lack of growth in the availability of natural-gas liquids is pushing olefin producers to heavier feedstocks. Lead removal will increase gasoline demand and cause less gasoline to be refined per crude oil barrel. To meet the octane requirements for unleaded gasoline, refiners will turn to more severe processing. Unless there is an immediate surge in additional refining capacity, the U. S. will have to rely on imported naphtha to help meet this demand. The primary means of increasing octane in no-lead gas will be increased aromatic content. If unleaded gasoline octanes go to about 93 RON, the cost will rise steeply. Increases in the value of aromatics on the order of 50% may be likely for pool octanes in the range of 96-97 RON. Benzene, xylene, and propylene demands are outlined. Ammonia and olefin producers have begun to experience shortages of natural gas and increased prices.

STANDARDS AND CRITERIA

1972

25544 **APTIC NO. 46390**

Greller, Werner

INCINERATORS. *(Abfallverbrennungsanlagen). Text in German. Tech. Ueberwach. (Duesseldorf), 13(7/8):243-246, July-Aug. 1972.*

The VDI guideline 2301 on the limitation of emissions from incinerators for throughputs of up to 1500 kg/hr has been revised. The most outstanding changes are briefly discussed. For avoidance of dust emissions from incinerators, dust collectors are necessary. The dust-free ash tap-off from the incinerator is needed. The revised guideline mentions for the first time nitrogen oxides among the pollutants emitted from incinerators. At the moment this pollutant does not affect the stack height or the waste gas cleaning in any way. It is recommended that the waste gas is cleaned rather than emitted from high stacks at hydrogen chloride concentrations greater than 5 g/cu m. This limit value will be reduced soon since a lowering of the maximum allowable emission concentration for HCl is under consideration. The importance of an adequate charging process is stressed. In the future, the manufacturer will have to state the charging rate in kg and l and the combustion time for each charge. For the auxiliary oil burner, the soot emission has been limited to number two on the Bacharach chart. The carbon dioxide reference value for the dust concentration has been lowered to 3.5% (formerly 7%). The maximum allowable dust concentration of the waste gas has been set to 100 mg/cu m. Stacks must be dimensioned to maintain an underpressure all the way from the blower.

LEGAL AND ADMINISTRATIVE

1972

25545 **APTIC NO. 46777**

NEW JERSEY CHECKS AUTO EXHAUST. *Environ. Sci. Technol., 6(9):785, Sept. 1972.*

New Jersey is the first state to require emissions testing as part of the annual state car inspection. Under the New Jersey Air Pollution Code, visible emissions from the engine or crankcase are illegal after July 1, 1973; motor vehicle dealers must inspect new cars and certify that they meet state inspection standards and emission standards for smoke, carbon monoxide, and unburned hydrocarbons; and all cars must be tested at the annual state inspection. Inspection test equipment uses nondispersive infrared monitors to measure levels of CO and HC. Beginning July 1, 1973, motorists must meet emissions requirements or fail inspection; 12-15% of the cars are expected to fail the test. As of July 1, 1974 the emission standards will get tighter; 20% of all cars now on the road would fail the test. On July 1, 1975, standards will again tighten; 1/3 of today s cars would fail.

25546 **APTIC NO. 46778**

NEW ENVIRONMENTAL CONTROL PROJECTS AT SHELL CANADA SARNIA REFINERY. *Oilweek (Calgary Can.), 23(29):26, 28, 32, 40, Sept. 4, 1972.*

An oil refinery pollution control program costing $2.5 million for air quality measures and $2.7 million for improved waste water quality is described. The sulfur content of the fuel is being reduced to reduce sulfur dioxide emissions. The remaining SO2 will be dispersed into the atmosphere by three new high stacks. Water pollution is being reduced by biological oxidation and oil separation. Oil spills are also being eliminated.

25547 **APTIC NO. 46875**

AIR POLLUTION: STEPS TOWARDS THE SET-UP OF AN AUTOMATIC ALARM NETWORK. *(Pollution de l air: Vers la constitution d un reseau d alerte automatique). Text in French. Tech. Moderne, 64(7-8):45-46, July-Aug. 1972. 5 refs.*

The activity of Institut Nationale de Recherche Chimique Appliquee in the field of air pollution control and measurement is reviewed. Apart from studies of analytical instruments and of the optimum conditions of pollution measurement, systematic pollution monitoring is conducted at sampling stations for short-term and long-term anti-pollution measures to be initiated. An air pollution monitoring network in the Rouen area is being converted into an automatic alarm system. Based on data obtained for seven monitoring stations over a succession of years, an empirical forecasting method, to be used for the siting of new pollution sources, for a posteriori determination of pollution levels, for the detection of abnormally high pollution levels, and for a priori calculation of pollution levels as a function of meteorological conditions, is being suggested. The forecasting method, using 14 variables such as temperature, wind direction, and sulfur dioxide and smoke concentrations operates with a set of 114 linear multiple regression equations for analytical and meteorological data.

25548 **APTIC NO. 46914**

Oficina Sanitaria Panamericana and Texas Univ., Houston, School of Public Health

HEALTH RELATED IMPACT OF ENVIRONMENTAL CHANGE. *(Consequencia de los cambios ambientales para la salud). Text in Spanish. Bol. Ofic. Sanit. Panam., 72(4):286-315, April 1972. 9 refs. (Presented at the Meeting of the Directorial Council of the Oficina Panamericana Sanitaria, 20th, Washington, D. C., Sept.-Oct. 1971.)*

A careful examination of the entire ecologic complex is needed to anticipate and avoid health consequences of the pollution of air and water. The administration of economic and resource development projects is an important factor. A legal basis for intervention into economic development is needed to prevent health effects. More engineers, systems analysts, sanitarians, and other personnel are needed, as well as better training for these people. Data processing, monitoring, international environmental programs, research programs, and sources of environmental information need to be improved and increased. Summary demographic and economic data are included for Latin America.

25549 **APTIC NO. 46989**

Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany), Abteilung Oeffentichkeitsarbeit

MBB ENVIRONMENTAL PROTECTION TECHNOLOGY FOR MONITORING MUNICH S AIR. *(MBB-Umweltschutztechnik zuer Ueberwachung der Muenchner Luft). Text in German. 3p., Aug. 1972.*

In cooperation with the Bavarian State Bureau for Environmental Protection, the City Planning Department of Munich, and the power plants in the area, an air monitoring system was installed in Munich which is the beginning of the planned Bavarian air monitoring system. It comprises a mobile measuring station, a stationary data evaluation station, and a stationary measuring station. The mobile station accommodated in an electrically driven station wagon measures the concentrations of carbon monoxide, sulfur dioxide, nitric oxide, nitrogen dioxide, ozone, and hydrocarbons. Simultaneously, the wind velocity, wind direction, temperature, pressure, and relative humidity are measured. The data evaluation station is located in the Olympic Park. The data received from the mobile station are decoded and evaluated (momentary values, maxima, average values, maximum allowable emission concentrations). Concentrations exceeding the maximum allowable emission concentration are indicated on a light panel. In the center of the city next to the stationary station, the measured data are accessible to the public.

25550 **APTIC NO. 46969**

Fair, Donald H.

SAROAD. STATION CODING MANUAL FOR AEROMETRIC SAMPLING NETWORK. *Office of Air Programs, Research Triangle Park, N. C., Div. of Atmospheric Surveillance, Pub. No. APTD-0907, 140p., Feb. 1972.*

NTIS: PB 211747

The SAROAD (Storage and Retrieval of Aerometric Data) Station Coding Manual identifies areas of the United States and their associated codes used in operation of the National Aerometric Data Bank. Under this nationwide station coding system, each aerometric sampling site is identified by a nine-digit number. The first two digits designate the state; the next four digits the city or county; and the last three digits identify discrete sampling sites within the city or county. (Author abstract modified)

25551 **APTIC NO. 46586**

Frankenfeldt, R. E.

COMPARATIVE CONSIDERATION OF THE ENVIRONMENTAL PROTECTION REGULATIONS CONCERNING THE ALUMINUM INDUSTRY IN VARIOUS COUNTRIES. *(Vergleichende Betrachtungen der Vorschriften zum Umweltschutz fuer die Aluminiumindustrie in verschiedenen Laendern). Text in German. Preprint, Gesellschaft Deutscher Metallhuetten und Bergleute, Clausthal-Zellerfeld (West Germany), 13p., 1972. (Presented at the Gesselschaft Deutscher Metallhuetten Bergleute-, Hauptversammlung, Stuttgart, West Germany, April 26-30, 1972.)*

The countries of West Germany, France, Great Britain, Italy, the Netherlands, Norway, Austria, Sweden, Switzerland, and Spain have laws concerning environmental protection which are of special interest to the aluminum industry. The laws in West Germany are listed as example. West Germany, Italy, Norway, Sweden, and Spain have laws specifically regulating the fluorine emissions. The regulations differ among the various countries. In Germany and in the Netherlands the regulations pertain solely to the emission of gaseous fluorides, this is, hydrogen fluoride. In Norway and Sweden the regulations pertain to both gaseous and particulate fluorine. The maximum allowable emission in the Netherlands is 0.4 kg gaseous F/t aluminum. In Norway the maximum allowable emissions are 1.0 and 2.6 kg gaseous and particulate F/t Al. Gaseous F is damaging to plants and ruminants. The laws and regulations affect only new industrial plants, with the exception of Germany and the Netherlands where already existing aluminum plants may have to comply with the law if its emissions affect the environment in any way. A short-term (0.002 mg gas F/cu m air) and a long-term (0.005 mg F/cu m) maximum allowable value will be issued for West Germany. In Italy the value of 0.020 mg gaseous and particulate F/cu m may not be exceeded during 24-hour measurements and 0.060 mg gas and particulate F/cu m during 30-minute measurements.

25552 **APTIC NO. 46429**

Hoffmann, Werner

RATIONAL ENVIRONMENTAL PROTECTION. EMISSION BALANCE ANALYSIS LEADS TO USEFUL INVESTMENTS. *(Rationeller Umweltschutz. Emissions-Bilanzanalyse fuehrt zu sinnvolleren Investitionen). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 26(36):29, 1972.*

For the avoidance of emissions, which is particularly costly for small and medium-sized enterprises, a new planning method has been worked out which has become known as Emission Balance Analysis. The method is equally applicable to individual enterprises as it is to a group of enterprises. It places great emphasis on direct recycling of polluting substances. Neighboring enterprises with common emission problems are advised to solve the problems jointly. Under the plan the causes of the emission are determined first and the possibilities of their avoidance by process modification are investigated. The methods of emission reduction are then taken into consideration. The best combination of methods for all emissions involved is then found by system analysis.

25553 **APTIC NO. 46638**

Keener, Kenneth C.

A CURRENT SURVEY OF FEDERAL AIR QUALITY CONTROL LEGISLATION AND REGULATIONS. *Natur. Resour. Lawyer, vol. 5:42-81, Jan. 1972. 290 refs.*

The historical development of Federal legislation in the field of air quality is reviewed, and the law as a result of the Clean Air Amendments of 1970 is analyzed. Air quality criteria and control techniques, ambient air quality standards, air quality control regions, standards of performance, emission standards, state implementation plans, and enforcement, penalties, and judicial review are considered for stationary sources. Motor vehicle emission standards, aircraft emission standards, and motor vehicle and aviation fuels are discussed.

25554 **APTIC NO. 46430**

Keune, Heinz

ERP CREDITS FOR ENVIRONMENTAL PROTECTION MEASURES. *(ERP-Kredite fuer Umweltschutzmassnahmen). Text in German. Chem. Ind. (Duesseldorf), 24(9):562-563, 1972. 16 refs.*

For more than ten years, European Recovery Program special credits were appropriated for investments into water purification. Some time later ERP credits for measures against air pollution were granted. First they were available only for the development of desulfurization methods. ERP credits for the construction of solid waste disposal facilities became available in 1972. The original condition to grant credits only for flue gas desulfurization plants has been extended to all cleaning measures. They may be granted for only such plants whose construction has not begun yet at the time of application.

25555 **APTIC NO. 46561**

Loewa, Ortwin

MOSTLY PROTEST AGAINST CITY PLANNING. *(Meist Proteste gegen die Stadtplanung). Text in German. Umwelt (Duesseldorf), 2(5):38-42, 1972.*

Hamburg is trying to get the help of each resident to combat environmental pollution. In order to create a green belt in the city, newlyweds were asked to plant a tree at a point of their own choice. Unfortunately the trees are threatened by automobile exhaust gases. The erection of an automatic air monitoring station at a cost of 1 million dollars is planned, as is the use of electrically driven garbage collection trucks. The planned erection of an aluminum plant in Stade met heavy opposition from public authorities. The emitted gases from such a plant which contain fluorine compounds which would be carried with the main wind direction East to Pinneberg, which has the largest tree nursery of the world. Another aluminum plant in Hamburg itself is scheduled to begin operation in 1973. Because of the regulations concerning fluorine emissions and red sludge, this plant will begin operation at a later date. Eight agencies deal with the protection of the environment. One environmental protection center coordinates information between the agencies. Since Mid-May of this year, an advisory panel of seven representatives of industry, research, and the public has been created, headed by the mayor of Hamburg. A first report by this panel conçerning environmental protection will come out in November.

25556 **APTIC NO. 46819**

Schachter, Esther Roditti

STANDARDS FOR EVALUATING A NEPA ENVIRONMENTAL STATEMENT. *Pub. Util. Fortn., 90(5):29-32, Aug. 31, 1972.*

Standards and some criteria are suggested for evaluating the sufficiency of an environmental impact statement (EIS) as set up in the National Environmental Policy Act (NEPA). The EIS advises interested administrative agencies, the Congress, and the public of the environmental consequences of any planned federal action. The EIS also forces administrative agencies to face the problems of pollution as early as possible and implements a comprehensive approach to environmental management. All of the cases thus far litigated under NEPA have been concerned with the procedural requirements of the statute, rather than the more flexible substantive standard. Criteria for evaluating an environmental impact statement include explicitness (assumptions must be stated; descriptive language and hard data must be included; the EIS must be comprehensible to concerned nonexperts; objectivity must be maintained), depth and scope (rigorous exploration of the issues is required; a complete and detailed record is required of the administrative agency; reasonableness will be the standard for judging the outer boundaries of comprehensiveness and detail in an EIS), and time (long-term effects of the action under consideration are to be considered from the perspective that each generation is trustee of the environment for the succeeding generations; the goal is to maximize the availability of alternatives to a proposed action in order to minimize environmental damage). It is to the advantage of an administrative agency and an applicant to maximize disclosure.

25557 **APTIC NO. 46908**

Wannoni, Luis L.

ENVIRONMENTAL POLLUTION. DETERMINING THE PRIORITIES FOR A PROGRAM OF ACTION. *(Contaminacion del ambiente. Determinacion de prioridades para programas de accion). Text in Spanish. Bol. Ofic. Sanit. Panam., 72(4):325-343, April 1972. (Presented at the Meeting of the Directorial Council of the Oficina Panamericana Sanitaria, 20th, Washington, D. C., Sept.-Oct. 1971.)*

In environmental pollution control, preventive actions, comprising research, education, and legislation, or curative actions, which include those necessary to solve imminent problems, can be taken. Because of the complexity of conditions and problems in Latin America and the Caribbean, the particular circumstances and conditions prevailing in each one must be taken into account when establishing the priorities for the actions to be taken. it will be the responsibility of international agencies and institutions to advise and assist the different countries in solving their health problems.

1971

25558 **APTIC NO. 46506**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF NEW YORK. *APTD-1046, 36p., June 1971.*

NTIS: PB 209996

Real property owned by the Federal Government in the state of New York is listed with information on the agency which operates the facility, location, the General Services Administration agency code, location code, floor area, and size classification code. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they present no air pollution potential.

25559 **APTIC NO. 46507**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF CALIFORNIA. *APTD-1023, 45p., May 1971.*

NTIS: PB 209968

Real property owned by the Federal Government in California is listed with information on the agency which operates the facility, location, General Services Administration agency code, location code, floor area, and size classification code. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they present no air pollution potential.

25560 **APTIC NO. 46508**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF PENNSYLVANIA. *APTD-1040, 33p., June 1971.*

NTIS: PB 210002

Real property owned by the Federal Government in Pennsylvania is listed with information on the agency which operates the facility, location, General Services Administration agency code, location code, floor area, and size classification code. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they present no air pollution potential.

25561 **APTIC NO. 46541**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF VIRGINIA. *APTD-1032, 26p., June 1971.*

NTIS: PB 210010

Real property owned by the Federal Government in Virginia is listed with information on the agency which operates the facility, location, General Services Administration agency code, GSA location code, floor area, and size classification code. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they present no air pollution potential.

25562 **APTIC NO. 46546**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF FLORIDA. *APTD-1017, 25p., May 1971.*

NTIS: PB 209973

Real property owned by the Federal Government in Florida is listed with location, agency which operates the facility, General Services Administration agency code, GSA location code, floor area, and size classification code. Installations with a floor area less than 1500 sq ft have been omitted since experience indicates that they present no air pollution potential.

25563 **APTIC NO. 46548**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF TEXAS. *APTD-1035, 38p., June 1971.*

NTIS: PB 210007

Federal property in Texas is listed. Each installation is listed with location, the agency which operates the facility, General Services Administration agency code, location code, floor area, and size category. Installations with a floor area less than 1500 sq ft have been omitted since experience indicates that they present no air pollution potential.

25564 **APTIC NO. 46549**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF SOUTH CAROLINA. *APTD-1038, 17p., June 1971.*

NTIS: PB 210004

Federal-owned real property in South Carolina is listed with its location, the agency which operates the facility, General Services Administration agency code, location code, floor area, and size classification code. Installations with a floor area less than 1500 sq ft have been omitted since experience indicates that they present no air pollution potential.

25565 **APTIC NO. 46550**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF LOUISIANA. *APTD-1060, 20p., June 1971.*

NTIS: PB 209982

Real property owned by the Federal Government in Louisiana is listed with information on the agency which operates the facility, location, General Services Administration agency and location codes, floor area, and size classification code. Installations with a total floor area less than 1500 sq ft have been omitted since experience indicates that they present no air pollution potential.

25566 **APTIC NO. 46554**

Study Group on Bad Odors (Japan)

BAD ODOR CONTROL LAW (REVISED - WITH RESOLUTIONS), LAW CODE NO. 91. *(Akushu boshiho - shusei futai ketsugi, Horitsu dai 91-go). Text in Japanese. 10p., June 1971.*

The purpose of this law is the maintenance of a healthy environment and the protection of public health by controlling and regulating odorous emissions from factories and other business operations. Odorous materials include ammonia and methyl mercaptan. Standards for emission, maximum allowable concentrations and other detailed regulations under this law are to be established by the governors of prefectures, based on consultation with cities, townships and villages under his jurisdictions, and by designating areas and classifications of odorous materials. Improvement advice and orders to be given to the operators of pollution sources, requests of mayors to governors, emergency treatments, odor measurements, prevention of bad odors in waterways, and prohibition of incineration of odor-causing materials, are discussed in general terms. Miscellaneous regulations include reporting and inspections, cooperation with related administrative agencies, subsidies, research programs, and delegation of administrative duties. The penal codes state that the violators of improvement orders are to be fined less than $330 and are subject to imprisonment for less than one year. Those who neglect to report or who submit false reports, or those who refuse, interrupt, or evade inspections are subject to a fine of less than $100.

25567 **APTIC NO. 46545**

Mencher, Simon K. and Daniel S. Jones

GUIDE TO TECHNICAL AND FINANCIAL ASSISTANCE FOR AIR POLLUTION CONTROL. *Gordian Associates Inc., New York, Environmental Protection Agency Contract 68-02-0331, APTD-1119, 143p., Nov. 1971. 5 refs.*

NTIS: PB 210670

The Clean Air Act, as amended by Congress in 1970, makes the Federal government responsible for providing state and local governments with the necessary technical and financial assistance to implement the Act. Federal, state, and other technical and financial assistance sources are described. Tax law provisions, sources of low cost financing and aid, eligibility requirements, application procedures, and review and appeal procedures are discussed. The tax incentives discussed are specifically for devices which control air pollution. These devices may also qualify for other forms of financial assistance. Tax exempt bonds, property tax exemptions, sales and use tax exemptions, franchise or income tax credits or deductions, accelerated amortization, and other types of assistance are mentioned.

SOCIAL ASPECTS

1972

25568 **APTIC NO. 46867**

Schreiber, Hans

PUBLIC RELATIONS WORK IN THE EMISSION CONFLICT. *(Oeffentlichkeitsarbeit im Emissionskonflict). Text in German. Metall. (Berlin), 26(10):1078-1080, Oct. 1972.*

Hints and devices on how to handle, by skillful public relations work, highly emotional emission conflicts created by various media in the public, are presented. Thorough analysis of the emission sources and of their susceptibility for evoking criticism by the public are the first step toward organizing pollution-related public relations work in the individual factory. The intervention of local and possibly high-ranking politicians supplied with relevant data on emissions and emission control measures on behalf of public-plagued management is of primary importance. Public relations efforts, undertaken toward media, employees, and the general public in the immediate community, should aim not only at revealing data on emissions and on outlays for their control, but also at emphasizing the economic role the company plays as an employer, thus putting nuisances and advantages deriving from the presence of the company back into their proper proportions.

GENERAL

1972

25569 **APTIC NO. 46797**

Bohr, Hinrich L. and Robert C. Cauthorn

POLLUTION: THE PROBLEM OF MISPLACED WASTE. *Am Scientist, 60(5):561-565, Sept.-Oct. 1972. 15 refs.*

Chemical and physical pollution is defined as matter in a harmful oxidation state or place, or energy in a harmful place. Pollution is a maldistribution of matter and energy among and within the air, water, and soil. Pollution is the direct result of inefficiency in the use of our material and energy resources and of the misplacement of those resources after use. The antithesis of pollution is recycling because it maintains resources in desirable states and reduces the pollution inherent in developing new resources. The abatement potential of pollution in air, water, or soil can be taken as the reciprocal of the time during which substances or energy remain in undesirable or physical states. The ability of air, water, and soil to counteract pollution is discussed.

25570 **APTIC NO. 46906**

Hanlon, John J.

HUMAN HEALTH, HUMAN VALUES, AND HUMAN ENVIRONMENT. *(La salud, los valores y el ambiente del hombre). Text in Spanish. Bol. Ofic. Sanit. Panam., 72(4):316-323, April 1972. 7 refs. (Presented at the Meeting of the Directorial Council of the Oficina Panamericana Sanitaria, 20th, Washington, D. C., Sept.-Oct. 1971.)*

Thermonuclear catastrophe, environmental catastrophe, and over-population now threaten man. Pollution of the air, land, food, and water is increasing. Man must find a system to benefit all of the people, to enhance, rather than to degrade, the environment, in order to continue existing.

25571 **APTIC NO. 46980**

Hatlapa, Christoph

THE SENSE OF RESPONSIBILITY OF THE YOUNG GENERATION CONCERNING THE PROTECTION OF THE ENVIRONMENT. *(Die Verantwortung der Jungen Generation fuer den Umweltschutz). Text in German. Protectio Vitae, no. 3:126-131, 1972. 35 refs.*

The committee on Critical Ecology of the Free University of Berlin studies the relations between ecology and society. Environmental pollution as an expression of the disturbed ecological equilibrium and the increasing impairment of social living conditions indicates the narrowness of a conception of progress, keyed exclusively to the priority of economic growth. The influence of the legal and economic systems on the failure of sciences as an effective sense-organ of society is discussed. The principle of provision and production as demanded by ecology must be put through politically against the oppositon of economic interests.

25572 **APTIC NO. 47062**

Schweigart, H. A.

ENVIRONMENTAL DISHARMONY AND THE BIOPOLITICS OF TOMORROW. *(Umweltdisharmonie und Biopolitik von morgen). Text in German. Protectio Vitae, no. 3:131-137, 1972.*

Technology has upset the balance of nature and natural ecosystems. From the year 2150 on the oxygen demand by the world population will be higher than the oxygen that can be produced by photosynthesis. At present the carbon dioxide surplus in the troposphere has reached 0.2%. The oxygen and CO2 balance will be the first and foremost biopolitical problem of the future. The presence is marred by such problems as pollution by the exhausts of otto and diesel engines and by benzopyrenes, lead compounds, unsaturated hydrocarbons, carbon monoxide, dust, and smoke from industries. The pollution by automobiles has reached proportions which affect the population in dense traffic areas. The emission of carcinogens and of nitrogen oxides has reached dangerous concentrations. In Austria the first highway project planned for the city of Bregenz fell through because a study termed its construction as too dangerous for the population of the city.

25573 **APTIC NO. 46820**

Wende, E. and F. Bister

AIR POLLUTION ASSOCIATED WITH CIVILIZATION. *(Zivilisationsbedingte Luftverunreinigungen). Text in German. Z. Allgemeinmed., 48(14):665-673, May 1972.*

In the Federal Republic of Germany, the principal sources of emissions are households, industry, and automotive traffic. The volume of these emissions rises every year at approximate average rates of 7, 5, and 3%, respectively. The most significant gaseous emissions are sulfur dioxide, hydrofluoric acid, nitrogen oxides, carbon dioxide, carbon monoxide and hydrogen sulfide. The finer dusts are more noxious, since upon inhalation they can penetrate into the lungs. The effects of benzopyrene and lead as dust or in aerosol form, the history of the several past smog catastrophies due to weather inversions in polluted areas, and mortality in relation to air pollution are discussed. Regular sampling and analysis of air is needed. Control methods include modifying technology, eliminating pollution in stack gases, or dissipating emissions by the use of chimneys. Control equipment includes filters, washers, and collectors. West German regulations and recommendations for the preservation of clean air are mentioned.

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46962	46968	46969	46970	46973	46974	46975	46976	46977	46978	46979	46980	46981	46983
46984	46985	46986	46987	46988	46989	46991	46992	46993	47001	47002	47003	47004	47005
47008	47011	47015	47016	47021	47022	47026	47027	47030	47041	47048	47050	47051	47052
47053	47054	47055	47056	47057	47058	47059	47060	47061	47062	47063	47064	47065	47066
47092	47093	47094	47095	47096	47097	47098							